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ASTOUNDING

MAY '46

Science-fiction

REG. U. S. PAT. OFF.

MAY 1946 25 CENTS

At the first sign of a Cold or Sore Throat

GARGLE LISTERINE ANTISEPTIC

YOU may help lessen a cold's severity or head it off entirely if you take this delightful precaution early and often, because . . .

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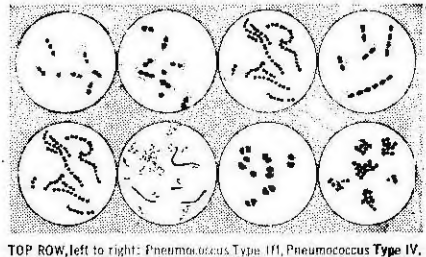
The threatening "Secondary Invaders" which Listerine Antiseptic attacks



TOP ROW, left to right: Pneumococcus Type III, Pneumococcus Type IV. Streptococcus Viridans, Friedlander's Bacillus. BOTTOM ROW, left to right: Streptococcus Hemolyticus, Bacillus Influenzae, Micrococcus Catarrhalis, Staphylococcus Aureus.

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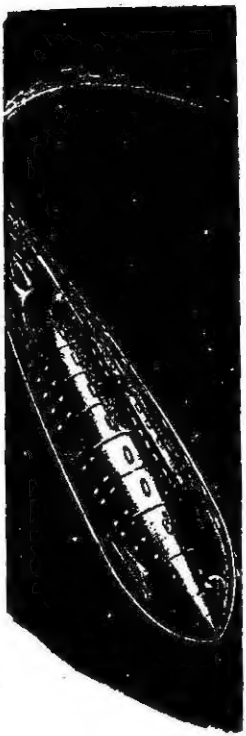

ASTOUNDING
SCIENCE FICTION

Reg. U. S. Pat. Off.

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The Third Great Advance

During the war, human technology advanced at the rate man is capable of attaining, instead of the slow rate man usually is willing to attain. In four years, science made strides that would, under the lesser stimuli of normal times, have required at least one, and in many instances four decades. Radar, and nuclear physics, are the best-publicized advances—the two really *new* technologies. (Radar is not new to science; Hertz demonstrated it way-back-when. Nuclear energy isn't new to science; the Cockcroft-Walton experiment in 1931 released the nuclear energy of the lithium atom by atomic fission under hydrogen bombardment. But neither had been accomplished on a technological—engineering—level.)

Medical science advanced greatly, of course—war invariably does that. It's one of the insanities of man that war, in the long run, saves far more lives than it consumes. Man is just stupid enough to limit the life-saving efforts of medicine in normal times in such a way that only in war can the great advances be made. It isn't that war is necessary to produce those advances; it's just that only during war do men try hard enough to make them. Those advances will, during the next ten years, save more lives, save more human misery, in the United States alone than all the destruction of war cost us. It's Man's own fault we have war—and it's Man's own fault that only during war do we learn how to protect life.

But such advances as medicine developed are additions to known fields, not the opening of new fields. There is a third great field of advance that has been practically unmentioned in general magazines. The third great discovery, like radar and nuclear physics, is the engineering development on a tremendous scale of a minor, half-forgotten laboratory fact. This third item has been mentioned before in Astounding—the development of silicone chemistry. Basically, silicone chemistry embraces the general field of complex chain-compound molecules, resembling the molecules of organic chemistry, but based on silicon dioxide instead of being based on carbon. They are not, accurately speaking, based on silicon, the element, instead of carbon, but on silicon dioxide, the compound, instead of carbon. There are many compounds based on silicon known, but these are called *silicides*, rather than *silicones*, and

they are completely unstable in an environment containing water and oxygen.

The silicones, on the other hand, are inherently far more stable to an environment containing water and oxygen than are the carbon-base organic compounds. Silicone rubber resembles natural rubber in nearly every way—but unlike carbon-based rubber, either natural or synthetic, the silicone rubber is immune to oxidation by air either when exposed to the ultraviolet of sunlight, or at temperatures well above the boiling point. Synthetic plastics based on silicone instead of carbon have been made; they resist heat and air far better than carbon-based materials. White enamels based on these silicone plastics can stand oven heats in a way no carbon plastic can, without discoloring or yellowing. Ultraviolet light has no effect, and age means far less to them.

The silicone chemistry is an enormous *field* of development, not simply a special development of a few special compounds. If there is a carbon-based material, it can probably be represented by a similar, but more stable, silicone based substance. There are silicone rubbers, oils, waxes, greases, plastics, varnishes, and so on already. What will be developed in the future remains unknown. But already these highly valuable compounds have been developed, and will begin appearing on the civilian market soon.

There is a silicone insulating fluid that is so excessively "wet" that it can be applied to a piece of metal, cloth, or the like which is covered with water. It will get under the film of water, wet the metal or other solid immediately, and exclude the water from contact. Sprayed on an automobile engine that is "drowned out," it will force the water off the ignition cables, spark plugs, and motor block, and form an insulating layer. The engine then starts immediately. Another member of the same family will, when put on unglazed porcelain, permanently prevent the formation of a film of water that would short-circuit or weaken by partial shorting, the high frequency currents used in radio.

Then there is an automobile lubricant oil that, unlike carbon-base oils, will not oxidize to form sludge, or varnish on the bearings. That alone would be an immense improvement. But in addition, there will be no need for summer and winter grades; the silicone oil flows with the same ease and fluidity in —40° temperatures as at 70°, and remains unchanged at 180° above zero.

There are equally remarkable waxes and greases now known. The field of silicone chemistry, like the field of nuclear physics, has only opened up. In its own way it is almost equally promising.

THE EDITOR.

The Nightmare

by CHAN DAVIS

This is a story of the immediate tomorrow—and of civilization headed down the inescapable road to destruction—down the road that we have, already, selected—and its nightmare end.

Illustrated by Swenson

Rob Ciccone bent down, picked up the bottle of milk outside the door of his apartment, and started to pick up the paper beside it. When he saw the headline that topped two columns on the left-hand side of the front page, he hesitated. Then he stood up and wiped his forehead.

The morning newspaper is essentially a simple, ordinary, and familiar thing. It's a habit. But it

doesn't seem quite so ordinary and familiar when you see your name in black type at the top of page one.

Rob picked up the paper and went back into the flat to read it. With forced deliberation, he slowly sat down in the most relaxing chair available and spread the paper carefully before starting the article. He was worried. As far as he knew there was no reason for him to be on page one. He did not belong there. He had, to be sure, been one of the speakers at the S.N.P. chapter meeting last night, but he had been planning to look for that write-up on page twenty-six or thereabouts. Worse, Rob's job was one of those in which you do not make page one in the New York *Dispatch*, or any other paper, unless it is bad news, and very bad.

He began to read, then the worry gave way to puzzlement. It was the report of the meeting after all, and carried, as he had expected, the by-line of his friend Creighton Macomb. It ran:

Ciccone Flays City's Geiger Search Policy; Warns Peril Grows

Dr. Robert A. Ciccone, chief of the Bronx Sector Radioactive Search Commission, stated last night that the present system of Geiger-counter search would not be adequate for the prevention of an A-bomb being planted in the New York area. Addressing the Bronx Chapter of the Society of Nuclear Physicists, he said: "No number of successes in preventing the importing of dangerous radioactives can compensate for just one failure, and I feel unable to state positively that failure, and disastrous failure, is impossible."

So far so good, thought Rob. At least they were quoting directly. Of course the sentence quoted was the most outspoken of the whole thing; it read like a much stronger attack on the search program than he had actually dared to make.

But the same thing had been said before by others. Ten years before, when the Geiger search had first been brought up as a counter-proposal to the Compton plan of decentralization, the whole subject had been batted back and forth in the press. Opponents of the search system, himself included, had claimed that New York was a sitting target for an atomic bomb, that no preventive measures could change that fact, and that the only answer to the danger was to scatter New York's industries and commerce over as wide an area as possible. The other party had poohpoohed this warning, pointing to the U.N.O. Security Council's strict supervision of all the world's piles, and to the greatly improved methods for the detection of radioactives. Finally, the second party had won. And since that time even the most extreme alarmists had been given less and less newspaper space. He had thought his speech would be played down, interpreted as a suggestion that search methods be improved. Instead—this. Why?

He read the remainder of the article hurriedly. It was O.K. Accurately reported, without editor-

ializing. But it didn't answer his question.

He thought of calling Crate Macomb, but looked at his watch and decided he'd have to wait. All through dressing, shaving, and breakfast, he was too preoccupied either to finish the paper or to give any thought to the rather suspicious results of some of the recent searches. Which in itself was unusual, for normally results that were not thoroughly innocuous were enough to take his mind off anything else.

At 8:15, when he was ready to leave for work, he dialed the *Dispatch*, gave an extension number.

"Could I speak to Macomb? That you, Crate?"

"Yeah. Hello, Rob." Macomb sounded ill at ease.

"I . . . er . . . I just called up to congratulate you on making the front page. Congratulate myself, too, of course."

"Congratulate—?" He sounded puzzled.

"That terrific billing I got in the paper this morning. I've got to admit I don't understand it. New editorial policy?"

"Oh, I get it. You've only seen the home edition, not the later editions."

"That's right. What have the later editions got?"

"Well, I'll tell you the whole thing." He dropped his voice. "The City Ed and I have been against this Geiger system right along, and looking for chances to slip through stories slanted against it."

"I thought you gave that up."

"I gave up bucking editorial policy openly, because it wasn't healthy, but I thought I'd take a chance on this story. The City Ed got it past His Nibs without too much trouble, it made the first edition, O.K., and we thought the thing would come off. But—"

"Yeah, but. I knew that was coming. What about those later editions?"

"That's the catch, all right. You remember what you told me last night before the meeting? About the aerial radioactivity your boys found over the Bronx yesterday?"

"You didn't let that into print, did you?"

"*I* didn't, no. I know well enough that radioactivity in the air might be either chance air currents from the Oswego pile, or hidden radioactives around the city, and whichever it is I know darn well that telling the people about it right away is the worst thing to do. Even if I had submitted copy on it, I wouldn't have expected it to get past the editor. But some cub reporter got the dope from the man who took the aerial tests, and didn't know any better than to submit it."

"And they ran it."

"And they ran it, yes." Crate paused, and said slowly: "They ran it in the same article with a rewritten version of what you read in the first edition."

"I can imagine. . . His Nibs couldn't recall the edition that fea-

tured my statement, so he set out to discredit me."

"That's it. It could be much worse." Crate's tone of voice indicated what he meant. He meant, "Probably it *will* be much worse."

Rob stopped to let the implications sink in. Finally, "Has the news started a panic in the Bronx? The news of the tests, I mean."

"Not yet. Look, Rob. His Nibs doesn't know I was responsible for the slant in the original offense this morning; he's blaming it on the City Ed. He doesn't know I know you personally, either. He does know I graduated in nuclear physics. So he's assigning me to—write a feature on you. Not a build-up."

"*Whew*— So?"

"So I'll have to do the best I can. So I'd appreciate it if I could see you some time soon and talk the whole thing over. I can tell you more then."

That certainly seemed to be in order, to put it mildly. Rob named a cafeteria near the *Dispatch* Building, promised to be right down, and rang off.

On his way to the subway station he picked up a *Dispatch*. He was still on the front page, and, as Crate had indicated, the treatment of him was rather different. He had not merely addressed the Society of Nuclear Physicists; in this edition he had done much more. He had failed his trust as Sector Search Commissioner. The high aerial radioactivity indicated that an A-bomb was being assembled somewhere in his sector, although his search groups had failed to detect the importing of the bomb materials. It was hinted that the reason he had stressed, in his speech, the impossibility of adequate searches, was to cover up his own incompetence when news of his failure broke.

The slur, he reflected, would probably not hurt him much. His job was not political, and if he were incompetent no amount of fast talking would help him. Conversely, the press couldn't hurt him, outside of discrediting his statement. Still, you had to be careful not to underestimate the power of the press.

The other angle was much more important. Suppose the paper's first charge were right. Suppose that yesterday's test results had been more than chance, and that for some reason, maybe for the purpose of building a bomb, radioactives really had been smuggled into his sector. He wouldn't try to guess who might be doing it; he didn't know politics. But the thing was possible. Well?

Before meeting Crate, he slipped into a phone booth and held a conversation—consisting chiefly of code phrases—with the Bronx Sector headquarters. When it was done he hurried into the cafeteria and spotted Macomb. He asked abruptly, "Your car in town today?"

"Yes, it is."

"The usual parking lot?"

"Yeah."

"Good. We'd better go uptown right away." Macomb came without question.

"I just phoned Charlie. They're still getting the same results, a little bit stronger, and consistent. The wind's changed to east, and the meteorologist says if the readings keep coming this way another hour there's no chance that it's a false alarm. They really should have got in touch with me earlier, but as it is I'll have to get there as quickly as I can."

"This takes precedence over everything else, all right."

"It takes precedence over just about anything in the whole city, if it's not a false alarm. Anyhow," he added as they climbed into the car, "you're not skipping out on your assignment. If you're going to succeed in getting a story on my incompetence, here's your chance, and I certainly hope I disappoint you."

They cut west toward Riverside Drive, Macomb at the wheel. When they were on the Drive, Ciccone asked suddenly, "Who runs the *Dispatch*, anyway?"

"The Ed does a pretty fair job."

"Yes, but . . . you told me once the Ed takes orders from somebody."

The other laughed. "Things aren't as simple as that in the newspaper racket. Nobody gives orders. But if any one man determines the policies of the paper, I guess it's Ellsworth Bates."

Ellsworth Bates. Ciccone ran over in his mind what he knew of the man. Bates was not, to the public, a prominent name. On the society page it was inconspicuous. In political news the name seldom appeared. Even in business news it ordinarily occurred only in listings of corporation boards. Yet apparently behind the scenes this Bates was a power; Macomb certainly should know.

"I was thinking," Rob went on. "Suppose for a minute a bomb is being assembled, and suppose Bates is connected with it. Wouldn't that explain what happened this morning?"

"Why—"

"First, he may succeed in confusing our sector organization by slinging mud at me. Second, he may confuse the whole borough by starting a panic. Third, he would surely jump on anything that might talk the public into decentralization; he'd want the city to remain a good, highly localized target. The decentralization issue was what started all this, remember."

"Hm-m-m. Sounds plausible at first, but—forget it. Not a chance of it. Nobody with Bates' financial interests in the city is going to try to destroy it, and that rules out not only Bates but anyone else with the power to high-pressure into print a slam against you. Besides—this bomb scare might start a panic among the populace, but on the other hand it puts the squeeze on the Search Commission, making sure they'll act as quickly and as efficiently as they can. No, forget it."

"Still, for whatever reason, Bates is probably back of His Nibs' policy."

"It'd be a good guess, all right."

"And why," Rob said, half to

himself, "does he go to such lengths to slap down anybody who speaks out for decentralization?"

They sped north along the Drive. Ahead of them was the Highway Search Station, where extrasensitive detectors would scan them, and, in case they revealed radioactivity, would operate relays, causing the car to be photographed and an alarm bell to be rung. Ciccone had been caught more than once; the detectors were so sensitive that small amounts of natural uranium adhering to his clothes and shoes after lab work could sometimes actuate them. This time they got past without the Search Commission's police giving chase.

They were now in the Bronx Sector. "Where to?" asked Crate.

"Just a minute. If you'll get off the Drive and stop at the next drugstore, I'll give Charlie another ring."

"Use my radiophone if you want."

"We avoid 'em. Easier to intercept them than it is to tap ordinary phone wires."

"O.K." Macomb acceded to Rob's request.

Another coded phone conversation and Ciccone returned to the car, to give a few brief directions. "We're going to look over Import Station Three," he explained. "There are two ways we might track this thing down. The first is to localize the source of the active gases by testing more air samples at a lower altitude. They're going ahead with that, and there's not much I can do to help. The second, assuming that bomb materials are still being shipped in, is to check the import stations through which all trucking passes."

"You sound pretty certain that it is a bomb."

"Without having any idea who would want to build one here and now, I'd say the probability was about twenty-five percent and growing all the time."

Unconsciously, Macomb gave the car another ten miles an hour's worth of gas.

Traffic was light, and they made good time to the import station. As they entered the vast, warehouselike building, Rob said: "I thought this'd be the station to inspect because those aerial tests seem to localize the thing between ten and fifty blocks northwest of here. Normally I wouldn't suspect this station of having a leak; they have the best equipment of any. They even make chemical analyses of samples of any cadmium that passes through."

"Cadmium? Why?"

"It's one way you might shield U-235 from the radiation detectors. Alloy it with plenty of cadmium and no neutrons get out. Just one of the dodges we have to be prepared for."

Inside the building, three lines of trucks were being sent slowly through what resembled roughly an assembly line. First the walls of the truck would be tested to insure that they were not radiation-absorbent, then a few of the crates, chosen at random, would be broken open

and inspected in the same way. Following this, the truck would be driven slowly down a long double line of confusingly different instruments, and would wait until it had been given the green light by the operators of all the instruments before it proceeded into the Sector. By this time the next truck would have finished its preliminary inspection and would be ready to roll through.

The most important of the detectors were modifications of the familiar Geiger-Mueller counter. An alpha particle, proton, or other emission would ionize the gas between two charged plates, allowing discharge. The discharges would be stored on a condenser, which in turn discharged through a glow tube if the counter operated more than a certain number of times in a given interval.

Ciccone and Macomb stood at one corner of the floor watching the procedure. Ciccone said: "It's not as effective as you might think. The stuff might be brought through here by packing it in the middle boxes of a big truckload, where the outside boxes would shield it. Those guys don't dig down and get at the inside often enough."

"I should think this'd be one job where they'd be more than willing to do a little extra work just to make sure."

"No, people aren't that way. It's a lot of work to half-unload one of those trucks. This is just a job to most of the men, no matter how hard we try to make it something more; it's just their job, and they make it as easy for themselves as they can.

"Today they're being pretty thorough, though; when I called Charlie I told him to needle the boys up a bit."

"So I see." A large Diesel crane was being used in one of the assembly lines to remove the contents of one truck for individual testing. Several men were clustered around with hand-test sets. In a few minutes Rob went over, motioning Crate to accompany him.

"One thing," he whispered on the way, "whatever you see, don't act more than normally suspicious. You can't forget the possibility that the truck driver, or even one of our men, might be an agent. Hello, Sam. What you got here?"

"Radium dial watches. Darn things scare the pants off us every time. Compared to the little tiny bloops we get on our meters from most of this stuff, they look like Hiroshima."

"Been getting many?"

"Yeah, a good few."

"I hope you check the inside boxes pretty often to make sure the watches' emissions aren't masking something else underneath."

"Yeah, we've been doing that."

"Well." Rob looked down at the one crate out of the truckload which contained the watches. It had been opened, and several of the carefully packed boxes removed. An idea struck him, and he mentally noted the address on the crate, while apparently examining the

watches. The watches were a standard American make.

"Well, keep up the good work, Sam," he said casually. "Oh, Sam. Have you seen the *Dispatch* this morning?"

"No, why?"

"Never mind." After watching a few more trucks pass uneventfully by, he left, accompanied by Macomb.

"Anson Mercantile Company," he said pensively as they climbed back into the car; "no street or number given. As I remember, it's about ten blocks west and four north. Suppose you let me drive, I think I can find it. If I have to, I'll ask a cop, but I didn't want to ask in there."

He did not have to ask a cop. At Anson's, the two of them looked enough like retailers to get into a salesman's office without delay. Rob interrupted the salesman's commercial cordiality by showing an F.B.I. badge, then asked without explanation, "Who's buying up that shipment of watches that's just coming in?"

"Why—let's see. I don't believe they're all ordered yet." He showed no inclination to continue.

"Who buys watches from you?" Rob prompted.

"Well—" The man listed several jewelry and department stores. "Those are the principal ones."

This was not going to be quite as simple as Rob had hoped. "Have any of them specified any individual shipments, rather than just naming brands?"

"I wouldn't know. I don't have anything to do with—"

"I think you know."

"What is this about, anyway?"

Rob debated whether to fib or to bully the man with his F.B.I. badge; he decided on the former course. "There's been some highjacking of watches, and we're trying to track it down." It didn't sound at all plausible, but the man, though baffled, was apparently satisfied.

"Well, now that you mention it," he admitted, "Grelner's has specified shipments several times." He stopped, tentatively.

"That's all," said Ciccone, and he and Macomb left, trying to look like G-men.

"Well," commented Rob, "I guess we can assume for now that he was telling the truth."

"Might I ask you something, sir?"

"Ask me what?"

"The same thing that fellow in there asked you: what the heck is this all about?"

Rob laughed. "I'm sorry. Those watches looked pretty innocent, didn't they, to be causing all this? But we have to follow up the implausible leads, because all the plausible ones get investigated at the import station. This one is 'highly nontrivial,' as my math prof used to say."

"Look. We let radium dial watches through the import station because no one could possibly extract the fissionable substances from the phosphorescent paint on those things without revealing themselves—even if they could get enough into the city that way. But there's another possibility. What if, instead of natural uranium, you were to use Pu-239, ordinary plutonium, in your phosphorescent paint? It's an alpha-emitter with long half-life, like common U-238; our instruments couldn't tell the difference. You'd have the job of purifying after you got the stuff in, and you'd have to get in an awful lot. It's just possible, just barely. And all the probable things, as I say, are checked."

"But it'd take so long to accumulate enough plutonium for a bomb. They couldn't be anywhere finished now, could they?"

"Sure could. They could have been accumulating the stuff for years without giving themselves away. It wouldn't be until they started purifying that Sneezy—the aerial radioactivity detector—would show anything. That's happened. We'd better follow up on Grelner's, and if it's not that, we'll start looking around again. Grelner's did, after all, ask for particular ship-

ments—those shipments, maybe, that they knew were loaded with plutonium. They wouldn't buy up the whole shipment, because that would seem peculiar to the wholesalers, and the Pu-239 watches are, I suppose, perfectly usable as such. They wouldn't ship the watches in direct to the store, because it's not usual business practice.

"Everything fits. Which in itself proves nothing. Still, we can't afford not to check it. I don't think I can get much farther with this investigating, I'd better order a search right now." They had been walking toward the store; now Rob started once more for a phone. "You call police, give my name and the code word 'antipasto', and say 'Grelner's Department Store.' I'll be calling the import station for some detectors."

Luckily Schmidt's Drugstore had two empty phone booths. Nobody looked up as they walked in and slipped into the booths.

Ciccone, as he dialed his number, had a sudden vision. A pillar of multicolored smoke rising from the city, erasing the Bronx and Manhattan down to Central Park, shattering windows in Nyack, lighting up the Albany sky. A nightmare, a familiar and a very real nightmare, an accepted part of modern life, something you couldn't get away from; and it seemed more immediate than ever right now. Trying to pretend it was just fancy, he looked out of the booth at the girl wiping off the drugstore counter, the middle-aged woman buying toothbrushes, the suspendered loafer thumbing through the magazines. He thought the commonplaceness of Schmidt's Drugstore might be reassuring; but it didn't help.

"Import Station Three."

"This is Ciccone. Could I speak to Sam?"

Again he waited. The nightmare was still there, and somewhere, quite likely just a few blocks from where he was now, were the few ounces of metal that might be the nightmare.

"Hello. Hello, Sam. Send down —*antipasto*—send down all your mobiles, except for one full battery to be left at the station. Grelner's Department Store. Know where it is?"

"Sure do. Right down." Sam hung up before Rob had a chance to tell him to hurry. He knew that an order like that, in a situation like that, just plain meant "hurry," in capital letters.

Hurry. It might already be too late, or they might have months to spare, or there might be no danger at all. Yet the chance was always there that one minute's delay might make all the difference.

Always that chance, he thought as he and Macomb walked up the innocent-looking street toward where the police and the search men would soon arrive. The chance that the time he had wasted at the meeting last night, and the hour he had wasted this morning because of that peculiar newspaper episode, might themselves have been fatal.

"And yet," he said aloud, "assuming we get to this bomb in time

–always assuming that—this man Ellsworth Bates, and whoever else he represents, may be more important than any one bomb. No number of successes can compensate for one failure—"

Crate interrupted him. "The police have started arriving!"

Ciccone knew the routine of the search; he'd been largely responsible for preparing police and search men alike for this eventuality. He knew perfectly well what had to be done, and he also knew that, since the organization was trained to function without him, there was little he could do besides helping with the details.

First a cordon had to be thrown around the block in as short a time as possible after giving the alarm. Plutonium, enough of it to make a bomb, could be taken from the block in a two-passenger coupé, or in the pockets of a few men willing to subject themselves to radioactive poisoning by carrying it inadequately shielded. So the police had to make sure that, for the present, everybody inside the cordon stayed inside.

The search men arrived not long after the police: a fleet of bizarre-looking, specially-built trucks, roaring through the city with sirens screaming, then pulling up in a group at one side of the block. The mobile search units made up a respectable detection laboratory in themselves. They carried, in addition to the larger, more sensitive instruments, enough simple hand-test sets to arm a large force of searchers. Some of these were distributed quickly to the policemen comprising the cordon, and the first part of the search began.

A bluecoat would beckon to one of the bewildered passers-by who had been caught in the cordon, and then, while a second policeman covered him, would search the man. This consisted in passing two test sets, one held in either hand, over all parts of his body; reading them and pressing a button to recharge the electroscopes and readjust the counters' potential; and frisking him in the standard manner. He would then be allowed—ordered, rather—to leave the block. In this way the sidewalks were rapidly cleared.

Macomb left Rob's side, pad and pencil in hand, to go to where a short, well-dressed man of about sixty was being searched by two bored policemen. Rob dismissed Macomb with the mental comment, "Good story for him."

Himself, he wanted to help with the big job: going through the buildings on the block, one by one, story by story, with every type of instrument from Geiger counter to uranium neutron-detector. It was a big job, it would take a lot of men a long time, and he knew they could use his help.

The detectors were already being unloaded from the trucks. Sam was organizing a group of about twenty search men to begin on the row of five- and six-story apartments that made up one side of the block.

"Say, Sam," began Rob.

"Oh, there you are," said Sam.

"I didn't see you; I was beginning to think that call was a fake. Have a counter."

"Say, Sam. why don't you start at the store itself?"

"The Sneezies are registering like hell right here—like all hell." He gave a few more instructions and the men scattered into the buildings.

Ciccone found it almost a relief to know that the source of the radioactivity had been located fairly closely. Now, all the uncertainties involved in his reasoning were resolved. It might have been that Grelner's, like the wholesaler's, was just an intermediate stage in the smuggling; it might have been that the whole lead was a false one. But it wasn't.

With Sam and one other, he started down the basement steps of the first apartment house, to begin the search at the bottom. One of the tenants was coming down from the second story and looked with amazed curiosity at their test sets and drawn guns. Sam waved him out onto the street, and the three of them continued on down.

But the tedious and dangerous hunt which they had anticipated was interrupted. Suddenly, a booming voice filled the air. Rob looked around for a loudspeaker, but, seeing none, concentrated on the words.

"You are looking," the voice said, with a slight foreign intonation, "for the bomb which is being assembled here. I would warn that we have a quantity of plutonium in excess of the critical mass. If any more men enter this block of buildings, or if anyone enters this particular building, then the bomb, which is in readiness, will be exploded."

Rob, followed by the others, ran out into the street. He didn't know why, but he felt an almost claustrophobic oppression on the apartment stairway. As if getting out of the building would do any good were an A-bomb to go off!

The voice from the hidden loudspeakers continued, to a petrified audience of policemen and search men: "We will leave our laboratory, which is that building formerly used as a warehouse by the Grelner's Store, by helicopter. You must not attempt to intercept us—"

Rob was standing beside the police captain, looking up at the expressionless row of apartment houses. The decision, he realized, was up to him. Was this a bluff, and dare they call it?

"—will, in any case, be detonated by radio in two weeks. This will give you time to largely clear the area, and the bomb will still accomplish our purpose of disruption. You must not interfere, and you must prepare for the explosion in exactly two weeks' time." A pause, then, "You are looking for the bomb which is being assembled here. I would warn—"

It was a record, and it was repeating. The whole message was in Ciccone's hands now; it was up to him. He looked nervously around him. The police captain, Macomb,

and the short, well-dressed old man to whom Macomb had gone earlier. Ciccone hardly saw them.

"—enters this particular building, then the bomb, which is in readiness, will be exploded. We will leave our laboratory—"

"It's a bluff," said Ciccone, and his voice sounded weak as death. "Enter the building."

The captain didn't move. but stared straight ahead, his jaw knotted.

"It's a bluff. If they were going to set off an A-bomb, they wouldn't give us the opportunity to clear the people out of the city, even those few people we could get out in two weeks. They'd try for maximum destruction.

"Either they're not ready, or they are and we've nothing left to lose. Enter the building."

"They're not ready," said a voice behind Rob. He turned; it was Macomb's companion. "Any group which would send agents to destroy New York, would plan that the agents also be destroyed. Thus any chance would be eliminated of this country's learning the identity of the group, and they might be spared retaliation. Only if the bomb could not be detonated would such a bluff as this be attempted, on the chance that a copter might escape."

Rob stared at the unknown in dumb amazement. The confidence and precision with which he had spoken were—inhuman.

But for the moment he ignored this remarkable interruption and turned once more to the captain. The latter's face had a look almost of resignation as he finally gave the necessary orders to about twenty of the policemen who lined the sidewalk. They hesitated; they, too, could hear that voice over the loudspeaker. "—will still accomplish our purpose of disruption. You must not interfere, and you must prepare for the explosion—"

Somehow, when the first of the policemen moved to obey, the others followed. Slowly they advanced toward a gap between two buildings, through which they could reach the spot the voice had named as the laboratory site.

"—that we have a quantity of plutonium in excess of the critical mass. If any more men enter this block of buildings—"

They advanced, and one by one disappeared through the gap. Ciccone waited. Maybe the men inside, whoever they were, had not observed the violation of their conditions. Yet.

Except for the loudspeaker, the whole street was in intolerable silence, as everyone—waited. Finally, as one, they relaxed and breathed more easily. It was not that they were absolutely certain yet that no bomb would go off, but simply that the tension could not be borne any longer.

The police captain turned to his car radio.

"In case those boys do get their helicopter off that roof," he said, "I'm going to call for some of our planes to intercept them."

Rob made a mental note to have

planes added to the search plan in the future, and nodded assent.

"No," Macomb's companion interjected. "It was a bluff, but you must allow them to escape."

Rob's previous amazement was redoubled. He could find no answer except to blurt, "Who are you, anyway?"

"Ellsworth Bates."

Before Ciccone could reply, all eyes were turned upward by a shout from one of the search men standing nearby. A helicopter was hovering above the apartment buildings, drifting slightly in the wind, and rising.

The captain turned again to his radio, but was halted by the urgency in Bates' voice as he repeated: "No, they must escape. If they are captured, it will be discovered whom they represent, and this country will certainly open fire in retaliation. Every trace of their identity must be lost if there's going to be any chance of peace. Don't you see? It doesn't matter that they are the aggressors, that we, in a sense, would be in the right were we to fight them—whoever they are. The only thing we must consider is the impossibility of our fighting any war with anybody, now. Unfortunately, it's a thing our government, and our people, will probably not consider if these men are identified.

"The whole thing can be reported to the Security Council. They can investigate—secretly. The United States must not investigate."

He paused. "Sabotage bomb attack is the only method of atomic warfare that can be used as long as the Security Council controls the world's atomic power. Fissionable elements are rigidly controlled, they're hard to get, no one can get enough of them away from the Security Council's jurisdiction to arm a fleet of rockets. And a fleet is what you'd need to stand a chance of getting through a modern radar-rocket defense screen. Sabotage bomb attack is the only thing left.

"Until open warfare breaks out. Then, one or both of the warring nations defy the Security Council, grab all the fissionable elements they can, and what have you? Chaos. Ruin. If you like to put it that way, the end of civilization. Once the Security Council's power is broken and the rocket-atomic war starts, we're lost, that's all.

"Mr. Ciccone, I realize you're in charge here, and I'm unable to force your decision. Nevertheless, you've *got* to let that copter get away—delay your pursuit, say, ten minutes, and don't make it seem deliberate. More than that, you've got to destroy the evidence in that building—again accidentally—and, if possible, destroy so much that it can't be proved a bomb was ever in the process of construction."

He stopped. Rob looked up to where the helicopter was dwindling into the distance. "Mr. Bates, if there has been one bomb, there can be another, maybe from the same source."

"No number of successes can make up for one failure. Precisely. But we wouldn't avert that pos-

sible failure by tracing down this bomb attempt. We'd precipitate it.

"Granted, we'd find the culprit's identity. But after the cities of this and every other country had been destroyed, it'd be small consolation to know who started the thing."

Then something happened inside Rob, and the nightmare was on him again. The light too bright to be seen, the sound too loud to be heard, the horror too great for any man to know. He sighed, and spoke to the captain:

"You heard what he said?"

"Yes."

"Do what he said about the helicopter. The rest of it, forget. I mean that—forget it."

Ciccone sat with Macomb and Bates in the front room of Crate's Greenwich Village flat, recounting the steps he had taken to follow Bates' plan. "It may work out," he said. "No one's been all the way inside the lab yet, except Sam and me. The lab will be accidentally destroyed tonight, after the plutonium has been removed and Sam has seen plenty of things which were not there at all. And, Mr. Bates, if your spell over the newspapers is as great as Macomb says it is, they may all print our version of the story." He indicated a *Dispatch* extra in his hand. "The radioactives were brought in by private experimenters dodging the U.N.O., they tried the bomb bluff in order to escape, and they then eluded police pursuers. No matter

how much perjuring we do it's a weak story."

"No," replied Bates, "with a few loopholes patched up, it'll go. If we're long on theorizing and minimize the actual faking; we'll get our result without much risk. And don't worry about the perjury; this is one end that justifies any means."

There was a silence while Ciccone gathered his courage. Bates was no longer the evil genius he had seemed earlier in the day; nevertheless courage was required to begin, "So now we have one success—we've postponed the fatal failure a little further."

Bates smiled. "Unless I miss my guess, you're getting back to decentralization."

Macomb took up the theme. "Yes," he said, "that problem's still there. This bomb's been found, this crisis may soon be over; but there'll be others. We'll never have even relative safety until everything is so uniformly distributed that no one bomb can destroy more than one of the old block-busters could now."

"I'll try to explain the thing to you," Bates began slowly. "You're right, that would be the only way to safety. You're also right in thinking that I've been suppressing the movement toward decentralization. Now wait a minute; please don't interrupt. I know I seem to be contradicting myself, but let me start from the beginning.

"Ten years ago several of the smaller European nations, which had not been getting much information on nuclear physics from the larger nations, independently developed working chain-reactions. Tension mounted, and a large-scale atomic war might have resulted had not the world been too exhausted from the recent World War II. As it was, everybody got such a bad case of the jitters that the affair was halted before the A-bomb was used.

"This world-wide case of the jitters had other effects, you remember. The Security Council was quickly given supervision over all piles, plus sizable military and intelligence forces. Second, the movement for decentralization was started."

"And stopped," put in Ciccone.

"Yes. To what, if I may ask, did you ascribe its failure?"

"Lack of vision on the part of —well, leaders of industry. People like you could have swung it."

"No. The people whom you call leaders of industry saw everything you saw in the situation, and they did try to swing it. The thing is, when they got right down to cases they saw something you missed; to be specific, they saw that decentralization was impossible."

"Impossible?"

"Because of a factor which the scientist finds it easy to ignore: the terrific inertia of our civilization. Here's the way it works. New York businessmen see that the world would be a much safer place if all business were to disperse away from the big metropolitan centers. They think it would be fine if this were to be done. But they can't do it themselves if, say, Prague businessmen are going to remain concentrated, because it'd be a big financial blow to New York to stand the expense of moving and to give up their ready access to transportation. They wouldn't be able to compete with Prague, or London, or Calcutta, as the case might be—whatever city didn't go along. Unless everybody will take the step, nobody will take it. It has to be world-wide, and ten years ago the world wasn't unified enough.

"You remember the 1929 crash? A little before your time, I guess. It was the same thing. The economists saw it coming several years ahead, but no one could duck out of the wave of overinvestment, because if they did, their competitors would not, and would continue to make profits from the boom. Everyone had to keep riding the wave as long as possible, even though they knew such a policy was just insuring that the crash, when it came, would be really serious. There you are: inertia. Our over-

grown civilization starts going in one direction, and it's just too much for individuals to stop.

"So decentralization was impossible ten years ago. With different conditions and with a stronger political movement, it might have gone; but it didn't. We took what seemed like the next best plan, radar screens plus search programs, and so far it's worked.

"Today, gradual decentralization has progressed to some extent, thanks to improved transportation and individuals' mistrust of cities. A new movement for the abrupt sort of decentralization would have some chance—less inertia now to overcome; but if it succeeded it would be very dangerous.

"In the last ten years, many things have changed. Reconstruction of the destruction of World War II is to all intents and purposes finished; capital is freed and looking for new investment opportunities; manufactured goods are looking around for markets. It's the type of situation where motives for aggression may be present, and everyone's jittery again. The jitters are not nearly so widespread as they were before, or even as they were after Hiroshima and Nagasaki, but they're having a much worse effect, and they're building up. Certain groups in several different countries are beginning to think seriously of atomic warfare, of beating the other guy to the punch and grabbing whatever's left when the smoke clears. Many of those who aren't considering it, are suspecting others. And everybody has to keep his defenses up.

"Now. What *are* our defenses? Let me list them again: radar screens, searches, and Security Council supervision of fissionable elements. Well, you tell me, Mr. Ciccone—what would happen to the effectiveness of your search program if New York were to begin tomorrow to move en masse to the Mohawk Valley?"

"Yes, I see what you mean. We'd have a hard time keeping up even a pretense."

"You certainly would. New York could be blasted before it had got well started moving. Another thing: atomic power plants, too, are centralized, to simplify the Security Council's job of control, so no doubt you'd ask that they be included in the program of dispersal. But think of the confusion involved in moving billions of dollars' worth of industrial plant. How could a merely human Security Council prevent the smuggling out, somewhere, of a few hundred pounds of U-235 or Pu-239?

"No, the pressure's on, and we have to stick by the choice we made.

"Our civilization: a great, big, overgrown truck going much too fast. Suddenly the road became dangerously narrow, and slippery besides, but the truck was too big and it was going too fast. It couldn't stop. Now we have only a few inches to spare on either side of our wheels, but we still can't do what you suggest, stop, get out, and look for a detour. No, we've

chosen our road and we've got to stick to it.

"Not much seems to be changed, at first glance—the truck's engine still runs smoothly—the steering gear still responds—even the driver isn't in such bad shape. Yet come tomorrow, it may all be over. If we don't steer straight, it certainly will be.

"Makes quite a picture. Our magnificent, overgrown, bungling civilization going on its own magnificent and senseless way because it is so big that nothing can stop it, so big that it can't even stop itself."

Bates stopped speaking, but neither Ciccone nor Macomb answered. There was no answer. Ten years ago, there might perhaps have been, but not now.

THE END.

IN TIMES TO COME

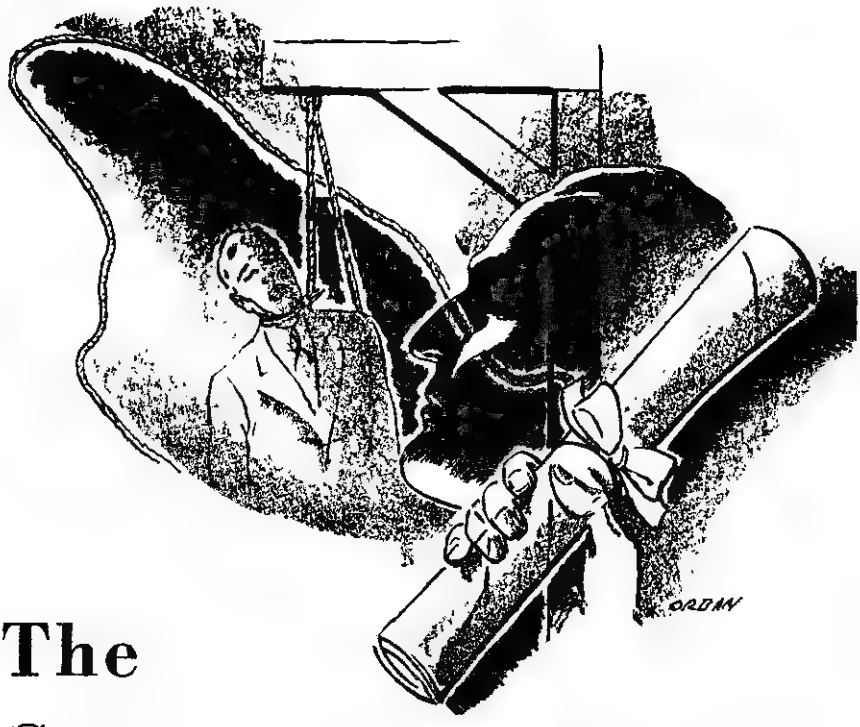
Beginning next month, Astounding Science-Fiction is going to undergo a general face-lifting, refurbishing, and rearrangement. The art work which has, on certain occasions in the past, been discussed with vigor, verve and disapproval by various readers, is getting a considerable going-over. We make no claims that, beginning with the next—the June—issue of Astounding, the art work, layout, and general make-up will represent ultimate perfection. But we do feel that there will be a real change for the better. You're cordially invited to praise or damn it as you feel it deserves, but if you feel it needs damning, please give reasons and, if possible, suggestions. Maybe I should add that suggestions that we use full-color photographs will be greeted with a total lack of response. So will a number of other delightful, but budget-busting ideas; color plates cost several hundred dollars per page.

The story content next month leads off with Ray Jones' story "Forecast." It's coincidence rather than plan that brings another story with a basis in weather—but a rather totally different result from the same basic starting point. Ray Jones isn't discussing the weather of alien planets, but of Earth—and the politics of weather. Most people would like a climate of eternal spring, with no rain. Farmers wouldn't—they need rain, and apple trees won't bear unless they pass through the cycle of winter-spring-summer. Winter-resort people like snow—lots of snow.

Now if we could just control the weather, and have just the kind of climate we want—uhmmmmm—but who's "we," and what do "we" want? And if the farmers in central Florida want rain for their crops, and the resort owners along the shores want nothing but sunshine—how are the weather-controllers to move the rain-producing storm-areas into central Florida without clouding up the seacoast, even if they somehow succeed in keeping it from drizzling all over the would-be sunbathers?

"Forecast"—as a forecast for weather control—suggests to Ray Jones that the political and economic conditions are going to make for Grade A #1 storms!

THE EDITOR.



The Cure

by LEWIS PADGETT

The simplest way to drive a sane man mad is to face him with an absolutely insoluble dilemma. There are more complex ways, of course—but the cure gets complicated, too, and sometimes fails—

Illustrated by Orban

When Dawson got back from his vacation in Florida, he was feeling no better. He hadn't expected a miraculous cure. In fact, he hadn't expected anything. Now he sat morosely at his desk, staring out at the tower of the Empire State and vaguely hoping it would topple.

Carruthers, his partner in the law firm, came in and bummed a cigarette. "You look lousy, Fred," he remarked. "Why not go out and have a drink?"

"I don't want a drink," Dawson said. "Besides, it's too early. I had enough liquor in Florida."

"Maybe too much."

"No. What griped me was . . . I dunno."

"Great psychoses from little acorns grow," Carruthers said, his plump, pale face almost too casual.

"So now I'm nuts?"

"You could be. You could be. Give yourself time. Why this abnormal fear of psychiatrists, anyway? I got psychoanalyzed once."

"What happened?"

"I'm going to marry a tall, dark woman," Carruthers said. "Just the same, psychiatry isn't in the same class with astrology. Maybe you bit your grandmother when you were a child. Drag it out in the open. As long as you keep thinking, 'What big teeth you have,' you'll dwell in a morass of mental misery."

"I'm not in a morass," Dawson said. "It's just—"

"Yeah. Just— Listen, didn't you go to college with a guy named Hendricks?"

"I did."

"I met him in the elevator last week. He's moved here from Chicago. Got offices upstairs, on the twenty-fifth floor. He's supposed to be one of the best psychiatrists in this country. Why not go see him?"

"What could I say?" Dawson asked. "I'm not followed by little green men."

"Lucky man," Carruthers said. "I am. Day and night. They drink my liquor, too. Just tell Hendricks you smell dead flies. You probably pulled the wings off an anopheles when you were a tot. It's as simple as that, see?" He rose from his chair, put his hand on Dawson's shoulder, and added quietly, "Do it, Fred. As a favor to me."

"Um. Well— O. K."

"Good," Carruthers said, brightening. He looked at his wristwatch. "You're due at his office in five minutes. I made the appointment yesterday." He fled, ignoring the curse Dawson flung at his head. "Room twenty-five-forty," he called, and slammed the door.

Scowling, Dawson located his hat, left word with the receptionist as to his whereabouts, and rode the elevator up. He met a short, fat, cherubic man in tweeds emerging from twenty-five-forty. Mild blue eyes considered him through glistening contact lenses.

"Hello, Fred," the man said. "Don't know me now, eh?"

"Raoul?" Dawson's voice was doubtful.

"Right. Raoul Hendricks, somewhat fatter after twenty-five years, I'm afraid. You look the same, though. Look, I was just going down to your office. I didn't have a chance to eat breakfast this morning. What about a bite downstairs?"

"Didn't Carruthers tell you—"

"We can kick that around better over food." Hendricks steered Dawson back to the elevator. "There's a lot I want to ask you about. The college chaps. I didn't

keep in touch. I was in Europe most of the time."

"I kept in touch," Dawson said. "Remember Willard? He's just been indicted in an oil mix-up—"

They talked over onion soup and through the entrée. Hendricks listened, mostly. Sometimes he watched Dawson, though not pointedly. They were in an isolated booth, and, after coffee had been served, Hendricks lighted a cigarette and blew a smoke ring.

"You want a snap diagnosis?" he asked.

"O. K."

"You're worried about something? Do you know what it is?"

"Certainly I know," Dawson said. "It's a sort of daydream. But Carruthers told you that."

"He said you smelled dead flies."

Dawson laughed. "On a windowpane. A dusty windowpane. Probably it isn't that at all. I just got the impression, no more than that. I never see anything. It's a sort of extension of sensory consciousness."

"It never occurs in your sleeping dreams?"

"If it does, I don't remember. It's always a flash. The worst part is that I *know* at the time that it's the windowpane that's real. Usually it happens when I'm doing some routine stuff. Suddenly I get this flash. It's instantaneous. I feel, very certainly, that whatever I happen to be doing at the time is a dream. And that really I'm somewhere smelling dead flies on a dusty windowpane."

"Like the Red King? You think somebody's dreaming you?"

"No. I'm dreaming — this." Dawson looked around the restaurant.

"Well," Hendricks said, "possibly you are." He stubbed out his cigarette. "We get into metaphysics at that point, and I'm lost. It doesn't matter which *is* the dream. The main thing is to believe in the dream while you're having it. Unless it's a nightmare."

"It isn't," Dawson said. "I've had a pretty good life so far."

"Then where are we? You don't know what's worrying you. The dream's merely a symbol. Once you realize what the symbol represents, the whole structure collapses, and any neuroses you may have are gone. As a general rule, anyway."

"Ghosts can't stand light, is that it?"

"That's it, exactly. Don't misunderstand me. Neuroses can build up eventually to true psychoses. You've got something like an olfactory hallucination. But there's no accompanying delusion. You know the windowpane isn't there."

"Yeah," Dawson said, "but there's something under my hand."

"Tactile hallucination? What does it feel like?"

"Cold and hard. I don't know what it is. If I move it, something will happen."

"Do you move it?"

After a long moment Dawson said "No," very softly.

"Then move it," Hendricks advised. He took out pencil and paper and adjusted his watch. "Let's have a jury-rigged word-association test. O. K.?"

"Well—why?"

"To find out the causation of your windowpane. If there's a mental block, if the censor's working, it'll show up. Spring cleaning. If you clean a house regularly, you save a lot of work later. No chance for cobwebs to accumulate. Whereas if you let the stuff pile up, you're apt to get a real psychosis, with all the trimmings. As I just said, it's a question of finding the cause. Once you locate that, you know it's a straw dummy, and it doesn't bother you any more."

"What if it isn't a straw dummy?"

"Then, at least, you've recognized it, and can take steps to get rid of the incubus."

"I see," Dawson said slowly. "If I'd been responsible for a man's death years ago, I could buy peace of mind by taking care of his orphaned children."

"Read Dickens," Hendricks said. "Scrooge is a beautiful case history. Hallucinations, persecution complex, guilt complex—and atonement." He glanced at his watch. "Ready?"

"Ready."

When they had finished, Hendricks blinked at the results. "Normal," he said. "Too normal. A few odd quirks—but it takes more than one test to get any definite result. We don't want to be empirical—though it's sometimes necessary. Next time you have that daydream, move the gadget under your hand."

"I don't know if I can," Dawson said.

But Hendricks only laughed. "Neural paralysis of the astral," he suggested. "I'm relieved, Fred. I'd rather gathered you were slightly off your rocker. But the layman always overestimates mental quirks. Your friend Carruthers has probably got you a bit worried."

"Maybe."

"So you've got a hallucinatory daydream. That isn't uncommon. Once we find the cause, you'll have nothing left to worry about. Come in tomorrow, any time—give me a call first—and we'll give you a physical checkup. More coffee?"

"No," Dawson said, and presently left Hendricks at the elevator. He was feeling irrationally relieved. Though he discounted a good deal of the psychiatrist's professional optimism, he felt that the man's argument held water. There was logic in it. And certainly it was illogical to let a daydream influence his moods so strongly.

Back in his office, Dawson stood at the window, staring out over the serrated skyline. The low, hushed roar of traffic mounted from the canyons below. In forty-two years he had come a long way, partner in a law firm, member of a dozen clubs, taking an active interest in a variety of matters—a long way,

for a boy who had begun his career in an orphan asylum. He had married once, but there had been a divorce, amicable on both sides. Now it was more convenient to maintain a bachelor apartment near Central Park. He had money, prestige, power—none of which would help him if the hallucination developed.

On impulse he left the office and visited a medical library. What he found only confirmed Hendricks' remarks. Apparently, as long as he didn't believe in the real existence of the dusty windowpane, he was fairly safe. When he did, dissociation stepped in, and all but subjective, false logic would fall. Men have a vital need to believe they are acting rationally—and, since so many basic motives are too hidden and complicated to unscramble, they assign arbitrary meanings to their actions. But why a dusty windowpane—

"Yeah," Dawson thought, thumbing through pages. "If I believed in this dream, I'd . . . uh . . . erect secondary delusions. I'd think of a good reason why there *was* a windowpane. Only there isn't any reason, luckily."

As he walked out of the library, and saw the stream of street traffic before him, he suddenly felt that he was dreaming. And the windowpane was back again.

He knew he was lying close against it, his nose almost touching the glass, inhaling dust with every breath, and the smothering, dreary, somehow brownish odor of dead flies. It was singularly horrid—that feeling of suffocation and dead despair. He could feel the hard something under his hand, and he knew with a sudden sense of urgency that unless he moved it —*now*—he was more than likely to smother there with his nose against the glass, smother from sheer inertia, inability to move. He knew he *must* not slip back into the dream of being Dawson. This was reality. There was nothing tangible about Dawson and his fool's paradise and his dream-city of New York. Yet he could lie here and die with the smell of dead flies in his nostrils, and Dawson would never suspect until that dreadful last moment between waking and death, when it was too late to move the . . . the hard object beneath his hand.

Traffic roared at him. He stood at the curb, white and sweating. The unreality of the scene before him was briefly shocking. He stood motionless, waiting until the hollow world had resumed its tangibility. Then, his lips tight, he hailed a taxi.

Two stiff shots of whiskey were comforting. He was able to contemplate working on the current brief, a liability case which presented no difficulties. Carruthers had gone to court, and he didn't see his partner that afternoon. Nor did the—hallucination —recur.

But, after dinner, Dawson telephoned his ex-wife, and spent the evening with her at a roof-garden. He didn't drink much. He was trying to recapture something of

the vital reality that had existed during the early part of their marriage. But he wasn't too successful.

The next morning Carruthers came in, perched on Dawson's desk, and cadged a cigarette. "What's the verdict?" he wanted to know. "Do you hear voices?"

"Often," Dawson said. "I'm hearing one now. Yours."

"But is Hendricks any good, really?"

Dawson felt unreasonably irritated. "Do you expect him to wave a magic wand? All therapy takes time."

"Therapy, huh? What did he say was wrong?"

"Nothing much." Dawson didn't want to discuss it. He opened a law book pointedly. Carruthers tossed his cigarette into the wastebasket and shrugged.

"Sorry. I'd thought—"

"Oh, I'm all right. Hendricks is pretty good, really. My nerves are a bit shot."

Comforted, Carruthers said something and went back to his office. Dawson turned a page, read a few words, and felt things close in. The morning sunlight, slanting through the window, faded abruptly. Under his hand was a cold, hard object, and strong in his nostrils was the dusty smell of despair. And this time he knew it was reality.

It did not last long. When it had gone, he sat quietly, staring at the hollow desk and the hollow wall beyond it. The sounds from the traffic below were dream-noises. The curl of smoke spiraling up from the wastebasket was dream-smoke.

"I hope you don't think you're real," Tweedledum said scornfully.

He noticed that the smoke had changed to orange flame. The curtain caught fire. Presently he would waken.

Someone screamed. Miss Anstruther, his secretary, stood in the doorway, pointing. After that, there was confusion, shouting, and the spurting of a fire extinguisher.

The flames died. The smoke vanished.

"Oh, dear," Miss Anstruther said, wiping a smudge from her nose. "It's lucky I came in when I did, Mr. Dawson. You had your nose in that book—"

"Yeah," Dawson said. "I didn't even notice. I'd better speak to Mr. Carruthers about throwing cigarettes in the wastebaskets."

Instead, he telephoned Hendricks. The psychiatrist could see him in an hour. Dawson passed the time with a crossword puzzle, and, at ten, went upstairs and stripped. Hendricks used stethoscope, blood-pressure gadget, and other useful devices.

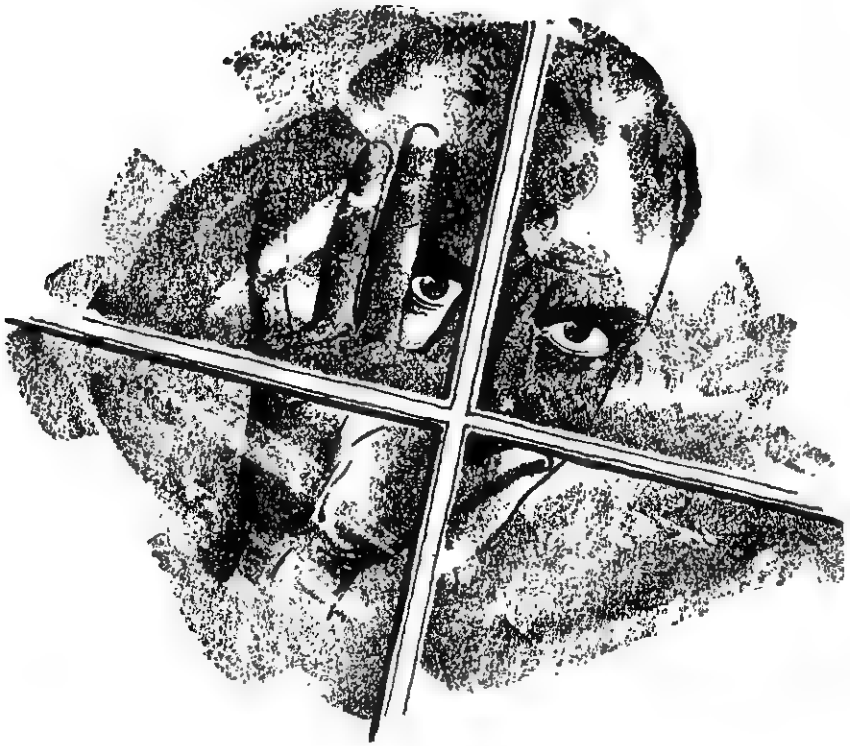
"Well?"

"You're all right."

"Sound as a nut, eh?"

"A nut?" Hendricks said. "Come on. Let's have it. What happened?"

Dawson told him. "It's like epilepsy. I don't know when I'll



have these attacks. They've never lasted long so far, but they might. And afterwards—the dream-feeling hangs over. I knew very well that there was a fire in the wastebasket, but it wasn't a real fire."

"Daydreams are apt to carry over a bit. Reorientation isn't always instantaneous."

Dawson chewed on a fingernail. "Sure, but—suppose Carruthers was falling out of a window? I wouldn't have tried to stop him. Hell, I'd have walked off a roof myself. I'd have known it wouldn't have hurt me. It's a *dream*."

"Do you feel you're dreaming now?"

"No," Dawson said, "not now, of course! It's only during these attacks, and afterward—"

"You felt that hard object under your hand?"

"Yeah. And the smell. There was something else, too—"

"What?"

"I don't know."

"Move that object. It's a compulsion," in four-bit words. And don't worry about it."

"Not even if I walk off a roof?"

"Stay away from roofs for a

while," Hendricks said. "Once you find out the meaning of this symbolism, you'll be cured."

"And if I don't, I'll get secondary delusions."

"You've been reading up on it, eh? Look. If you think you're the richest man in the world, and you haven't got a dime in your pocket, how'll you rationalize that?"

"I don't know," Dawson said. "Maybe I'm eccentric."

Hendricks shook his head, his plump cheeks bobbing. "No, you'll develop the logical delusion—a supplementary one—that you're the victim of an organized plot to rob you. Catch? Don't try to assign phony meanings to your dusty windowpane. Don't start thinking a little man named Alice is popping out of the woodwork with a windowpane tucked under his arm. Or that the glass-blowers' union wants to persecute you. Just find the real meaning behind the symbolism. As I told you. Move that gadget under your hand. Don't simply be passive about it."

"O. K.," Dawson said. "I'll move it. If I can."

He dreamed that night, but it was a typical dream. The familiar hallucination didn't emerge. Instead, he found himself standing on a gibbet, a rope about his neck. Hendricks came rushing up, waving a paper roll tied with a blue ribbon. "You're reprieved!" the psychiatrist shouted. "Here's your pardon! Signed by the governor." He thrust the roll into Dawson's hands. "Open it," he ordered urgently. "Untie the ribbon." Dawson didn't want to, but Hendricks kept insisting. He pulled at the ribbon. As he did, he saw that it was tied to a long cord that snaked across the platform and vanished from sight beneath it. A bolt clicked. He felt the trapdoor quiver under his feet. By pulling at the ribbon, he had opened the drop; he was falling.

He woke up, sweating. The room was dark and silent. Cursing under his breath, Dawson got up and took a cool shower. He had not had nightmares for years.

There were, after that, two more interviews with Hendricks. Each time the psychiatrist probed more deeply. But the refrain never altered. *Recognize the symbol. Move your hand. Remember.*

On the third day, as Dawson sat waiting in Hendricks' outer office, he remembered.

The familiar, leaden, sick inertia swept over him. Desperately he tried to focus on the buildings outside the window. But he could not battle the tide. At the last moment Hendricks' advice occurred to him, and, as he felt the cold hard object under his palm, he made a tremendous effort to move his hand.

To the left, something told him. *To the left.*

It was hard to battle that lethargy, that smothering, dusty suffocation of despair. And it was hard to move. But he strained to send the impulse down his arm, into stiff fingers, and the

effort told. He felt something click into place, and . . . and—

He remembered.

The last thing before—

Before what?

"Vital therapy," a voice said. *"We grow fewer yearly. And we must guard against that plague."*

Karestly ran an eight-fingered hand over his sweating, bald head. "The tests show you need it, Dawsao."

"I hadn't—"

"You wouldn't know of course. It'd be imperceptible except by the instruments. But you need the therapy, that's certain."

"I can't spare the time," Dawsao said. "The simplification formulas are just beginning to clear up. How long must I stay in the vorkyl?"

"Half a year," Karestly said. "It doesn't matter."

"And Pharr went in last month."

"He needed it."

Dawsao stared at the wall, made a mental signal, and opaqueness faded to translucence and transparency. He could see the City.

Karestly said, "You'd never vorkylled before. You're one of the youngest. It isn't bad. It's stimulating, curative, and necessary."

"But I feel normal."

"The machines don't lie. The emotion factor is wrong. Listen to me, Dawsao. I'm a great deal older than you, and I've been in the vorkyl twelve times."

Dawsao stared. "Where to?"

"Different eras each time. The one best fitted for my particular warp. Once it was Brazil in 1890. Another time, Restoration London. And the Second Han Empire. I had plenty to do. I spent ten years in Brazil, building a rubber empire."

"Rubber?"

Karestly smiled. "A substance—it was important at that time. I kept busy. It's fine therapy. In those days, the only therapy they knew involved painting, construction—visual and tangible, not the emotional and psychic therapy we use. However, their minds weren't developed."

"I hate the idea of being shut up in a five-sensed body," Dawsao said.

"You wouldn't know any better. There's the artificial mnemonic angle. Your life-force will take possession of the body that's created for you at the therapic epoch we choose, and you'll have a full set of phony memories, created especially for that period. You'll probably begin as a child. There may be temporal compression, so you'll be able to live thirty or forty years in a half-year of our time."

"I still don't like it."

"Time travel," Karestly said, "is the best therapy known today. You live in a new environment, with a new set of values. And *that's* the vital part. You get away from the current herd instinct that's caused all the trouble."

"But—" Dawsao said, "but! Only four thousand of us still sane, in all the world! And unless we work fast—"

"We're not immune. The whole trouble is that for hundreds of generations the race has followed false values, which conflicted with the primary instincts. Overcomplication plus oversimplification, both in the wrong places. We haven't kept pace with our growing mentality. There was a man —Clemens—who owned a mechanical typesetter that was perfect except for one thing. It was too complicated. When it worked, it was ideal, but it kept breaking down."

"Old stuff," Dawsao said. "I know the trouble. The machines are so enormously complicated now that humans can't keep up with them."

"We're solving it," Karestly said. "Slowly, but surely. There are four thousand of us. And we know the right therapy now. After you've had six months in the vorkyl, you'll be a new man. You'll find temporal therapy is foolproof and absolutely certain."

"I hope so. I want to get back to my work."

"If you went back to it now, you'd be insane in six months," Karestly pointed out. "Temporal travel is like preventive serum shots. You'll be occupied; we'll send you back to the twentieth century—"

"That far back?"

"That period's indicated, in your case. You'll be given a complete set of artificial memories, and, while you're in the past, you'll have no consciousness of reality. Of *this* reality, I mean."

"Well—" Dawson said.

"Come on." Karestly rose and floated toward the transporter-disk. "The vorkyl's ready for you. The matrix is set. All you have to do is—"

Dawsao got into the case. It closed behind him. He took a last look at Karestly's friendly face and tightened his hand on the control. He moved it toward the right.

Then he was Fred Dawson, with a complete set of artificial memories, in the orphan asylum in Illinois.

But now he lay in the vorkyl, his nose against dusty glassocene that smelled of dead flies, and the vitiated air tore at his throat as he tried to breathe. All was in gray semidarkness around him. He sent out a frantic thought-command.

Somewhere light grew. The distant wall faded to transparency. He could see the city.

It had changed. It was older. And a heaped pile of dust made a canopy atop the vorkyl in which he rested.

The immense, red sun washed the city in bloody gloom. There was no sign of organized activity. Figures moved here and there in the ruins. He could not make out what they were doing.

He looked for Administration Building, the last stronghold of the race. It had altered, too. A long time must have passed since he had entered the vorkyl. For ruin had touched the great tower, and the

white, naked shapes that crawled up and down the structure showed no sign of intelligence. The last light had gone out, then. The tide of madness had engulfed the four thousand.

He used his seventh sense of perception, and his guess was confirmed. In all the world, there was no sanity. The herd instinct had triumphed.

And he could not breathe. That suffocating horror was a reality now. The last oxygen left in the sealed case was rapidly being absorbed by his now-active lungs. He could, of course, open the vorkyl—

To what?

Dawsao moved his hand. The control swung to the right again.

He was sitting in the psychiatrist's outer office. The receptionist was at her desk, scribbling something; she didn't look at him. The white light of morning sunshine made patterns on the rug.

The reality—

"You may go in now, Mr. Dawson."

Dawson stood up and walked into Hendricks' sanctum. He shook hands, muttered something, and sank into a chair.

Hendricks referred to his charts. "O.K., Fred," he said. "Feel up to another word-association test? You're looking a bit better."

"Am I?" Dawson said. "Maybe I know what the symbol represents now."

Hendricks looked at him sharply. "Do you?"

"Maybe it isn't a symbol at all. Maybe it's a reality."

Then the familiar sensation came back, the dusty, suffocating claustrophobia, and the windowpane, and the brownish, dry smell, and the sense of terrible urgency. But there was nothing to be done about it now, nothing at all. He waited. In a moment it was gone again, and he looked across the desk at Hendricks, who was saying something about the danger of secondary delusions, of rationalizing.

"It's a matter of finding the right sort of therapy," insisted the hollow man.

THE END.

Rescue Party

by

ARTHUR C. CLARKE

The mission was to rescue a fraction of a population—because the Galactic Union hadn't known that the Earth's Sun had inhabited planets until too late. But they did know it was going Nova!

Illustrated by Kildale

Who was to blame? For three days Alveron's thoughts had come back to that question, and still he had found no answer. A creature of a less civilized or a less sensitive race would never have let it torture his mind, and would have satisfied himself with the assurance that no one could be responsible for the working of fate. But Alveron and his kind had been lords of the Universe since the dawn of history, since that far distant age when the Time Barrier had been folded round the cosmos by the unknown powers that lay beyond the Beginning. To them had been given all knowledge —and with infinite knowledge went infinite responsibility. If there were mistakes and errors in the administration of the Galaxy, the fault lay on the heads of Alveron and his people. And this was no mere mistake: it was one of the greatest tragedies in history.

The crew still knew nothing. Even Rugon, his closest friend and the ship's deputy captain, had been told only part of the truth. But now the doomed worlds lay less than a billion miles ahead. In a few hours, they would be landing on the third planet.

Once again Alveron read the message from Base: then, with a flick of a tentacle that no human eye could

have followed, he pressed the "General Attention" button. Throughout the mile-long cylinder that was the Galactic Survey Ship *S9000*, creatures of many races laid down their work to listen to the words of their captain.

"I know you have all been wondering," began Alveron, "why we were ordered to abandon our survey and to proceed at such an acceleration to this region of space. Some of you may realize what this acceleration means. Our ship is on its last voyage: the generators have already been running for sixty hours at Ultimate Overload. We will be very lucky if we return to Base under our own power.

"We are approaching a sun which is about to become a Nova. Detonation will occur in seven hours, with an uncertainty of one hour, leaving us a maximum of only four hours for exploration. There are ten planets in the system about to be destroyed—*and there is a civilization on the third.* That fact was discovered only a few days ago. It is our tragic mission to contact that doomed race, and if possible to save some of its members. I know that there is little we can do in so short a time with this single ship. No other machine can possibly reach the system before detonation occurs."

There was a long pause during which there could have been no sound or movement in the whole of the mighty ship as it sped silently towards the worlds ahead. Alveron knew what his companions were

thinking and he tried to answer their unspoken question.

"You will wonder how such a disaster, the greatest of which we have any record, has been allowed to occur. On one point I can reassure you. The fault does not lie with the Survey.

"As you know, with our present fleet of under twelve thousand ships, it is possible to re-examine each of the eight thousand million solar systems in the Galaxy at intervals of about a million years. Most worlds change very little in so short a time as that.

"Less than four hundred thousand years ago, the survey ship *S5600* examined the planets of the system we are approaching. It found intelligence on none of them, though the third planet was teeming with animal life and two other worlds had once been inhabited. The usual report was submitted and the system is due for its next exam-

ination in six hundred thousand years.

"It now appears that in the incredibly short period since the last survey, intelligent life has appeared in the system. The first intimation of this occurred when unknown radio signals were detected on the planet Kulath in the system X29.35, Y34.76, Z27.93. Bearings were taken on them and they were found to come from the system ahead.

"Kulath is two hundred light-years from here, so those radio waves had been on their way for two centuries. Thus for at least that period of time a civilization has existed on one of these worlds —a civilization that can generate electromagnetic waves and all that that implies.

"An immediate telescopic examination of the system was made and it was then found that the sun was in the unstable prenova stage. Detonation might occur at any moment, and indeed might have done so while the light waves were on their way to Kulath.

"There was a slight delay while the supervelocity scanners on Kulath II were focused on to the system. They showed that the explosion had not yet occurred but was only a few hours away. If Kulath had been a fraction of a light-year further from this sun, we should never have known of its civilization until it had ceased to exist.

"The Administrator of Kulath contacted Sector Base immediately, and I was ordered to proceed to the system at once. Our object is to save what members we can of the doomed race, if indeed there are any left. But we have assumed that a civilization possessing radio could have protected itself against any rise of temperature that may have already occurred.

"This ship and the two tenders will each explore a section of the planet. Commander Torkalee will take Number One, Commander Orostron Number Two. They will have just under four hours in which to explore this world. At the end of that time, they *must* be back in the ship. It will be leaving then, with or without them. I will give the two commanders detailed instructions in the control room immediately.

"That is all. We enter atmosphere in two hours."

On the world once known as Earth the fires were dying out: there was nothing left to burn. The great forests that had swept across the planet like a tidal wave with the passing of the cities were now no more than glowing charcoal and the smoke of their funeral pyres still stained the sky. But the last hours were still to come, for the surface rocks had not yet begun to flow. The continents were dimly visible through the haze, but their outlines meant nothing to the watchers in the approaching ship. The charts they possessed were out of date by a dozen Ice Ages and more deluges than one.

The *S9000* had driven past Jupiter and seen at once that no life could exist in those half-gaseous oceans of compressed hydrocarbons,

now erupting furiously under the sun's abnormal heat. Mars and the outer planets they had missed, and Alveron realized that the worlds nearer the sun than Earth would be already melting. It was more than likely, he thought sadly, that the tragedy of this unknown race was already finished. Deep in his heart, he thought it might be better so. The ship could only have carried a few hundred survivors, and the problem of selection had been haunting his mind.

Rugon, Chief of Communications and Deputy Captain, came into the control room. For the last hour he had been striving to detect radiation from Earth, but in vain.

"We're too late," he announced gloomily. "I've monitored the whole spectrum and the ether's dead except for our own stations and some two-hundred-year-old programs from Kulath. Nothing in this system is radiating any more."

He moved towards the giant vision screen with a graceful flowing motion that no mere biped could ever hope to imitate. Alveron said nothing: he had been expecting this news.

One entire wall of the control room was taken up by the screen, a great black rectangle that gave an impression of almost infinite depth. Three of Rugon's slender control tentacles, useless for heavy work but incredibly swift at all manipulation, flickered over the selector dials and the screen lit up with a thousand points of light. The star field flowed swiftly past as Rugon adjusted the controls, bringing the projector to bear upon the sun itself.

No man of Earth would have recognized the monstrous shape that filled the screen. The sun's light was white no longer: great violet-blue clouds covered half its surface and from them long streamers of flame were erupting into space. At one point an enormous prominence had reared itself out of the photosphere, far out even into the flickering veils of the corona. It was as though a tree of fire had taken root in the surface of the sun—a tree that stood half a million miles high and whose branches were rivers of flame sweeping through space at hundreds of miles a second.

"I suppose," said Rugon presently, "that you are quite satisfied about the astronomers' calculations. After all—"

"Oh, we're perfectly safe," said Alveron confidently. "I've spoken to Kulath Observatory and they have been making some additional checks through our own instruments. That uncertainty of an hour includes a private safety margin which they won't tell me in case I feel tempted to stay any longer."

He glanced at the instrument board.

"The pilot should have brought us to the atmosphere now. Switch the screen back to the planet, please. Ah, there they go!"

There was a sudden tremor underfoot and a raucous clanging of alarms, instantly stilled. Across the vision screen two slim projectiles dived towards the looming mass of

Earth. For a few miles they traveled together: then they separated, one vanishing abruptly as it entered the shadow of the planet.

Slowly the huge mother ship, with its thousand times greater mass, descended after them into the raging storms that already were tearing down the deserted cities of Man.

It was night in the hemisphere over which Orostron drove his tiny command. Like Torkalee, his mission was to photograph and record, and to report progress to the mother ship. The little scout had no room for specimens or passengers. If contact was made with the inhabitants of this world, the *Sooooo* would come at once. There would be no time for parleying. If there was any trouble the rescue would be by force and the explanations could come later.

The ruined land beneath was bathed with an eerie, flickering light, for a great auroral display was raging over half the world. But the image on the vision screen was independent of external light, and it showed clearly a waste of barren rock that seemed never to have known any form of life. Presumably this desert land must come to an end somewhere. Orostron increased his speed to the highest value he dared risk in so dense an atmosphere.

The machine fled on through the storm, and presently the desert of rock began to climb towards the sky. A great mountain range lay ahead, its peaks lost in the smoke-laden clouds. Orostron directed the scanners towards the horizon, and on the vision screen the line of mountains seemed suddenly very close and menacing. He started to climb rapidly. It was difficult to imagine a more unpromising land in which to find civilization and he wondered if it would be wise to change course. He decided against it. Five minutes later, he had his reward.

Miles below lay a decapitated mountain, the whole of its summit sheared away by some tremendous feat of engineering. Rising out of the rock and straddling the artificial plateau was an intricate structure of metal girders, supporting masses of machinery. Orostron brought his ship to a halt and spiraled down towards the mountain.

The slight Doppler blur had now vanished, and the picture on the screen was clear-cut. The lattice-work was supporting some scores of great metal mirrors, pointing skywards at an agle of forty-five degrees to the horizontal. They were slightly concave, and each had some complicated mechanism at its focus. There seemed something impressive and purposeful about the great array; every mirror was aimed at precisely the same spot in the sky—or beyond.

Orostron turned to his colleagues.

"It looks like some kind of observatory to me," he said. "Have you ever seen anything like it before?"

Klarten, a multitentacled, tripedal creature from a globular cluster at the edge of the Milky Way, had a different theory.

"That's communication equipment. Those reflectors are for focusing electromagnetic beams. I've seen the same kind of installation on a hundred worlds before. It may even be the station that Kulath picked up—though that's rather unlikely, for the beams would be very narrow from mirrors that size."

"That would explain why Rugon could detect no radiation before we landed," added Hansur II, one of the twin beings from the planet Thargon.

Orostron did not agree at all.

"If that *is* a radio station, it must be built for interplanetary communication. Look at the way the mirrors are pointed. I don't believe that a race which has only had radio for two centuries can have crossed space. It took my people six thousand years to do it."

"We managed it in three," said Hansur II mildly, speaking a few seconds ahead of his twin. Before the inevitable argument could develop, Klarten began to wave his tentacles with excitement. While the others had been talking, he had started the automatic monitor.

"Here it is! Listen!"

He threw a switch, and the little room was filled with a raucous whining sound, continually changing in pitch but nevertheless retaining certain characteristics that were difficult to define.

The four explorers listened intently for a minute; then Orostron said: "Surely that can't be any form of speech! No creature could produce sounds as quickly as that!"

Hansur I had come to the same conclusion.

"That's a television program. Don't you think so, Klarten?"

The other agreed.

"Yes, and each of those mirrors seems to be radiating a different program. I wonder where they're going? If I'm correct, one of the other planets in the system must lie along those beams. We can soon check that."

Orostron called the *S9000* and reported the discovery. Both Rugon and Alveron were greatly excited, and made a quick check of the astronomical records.

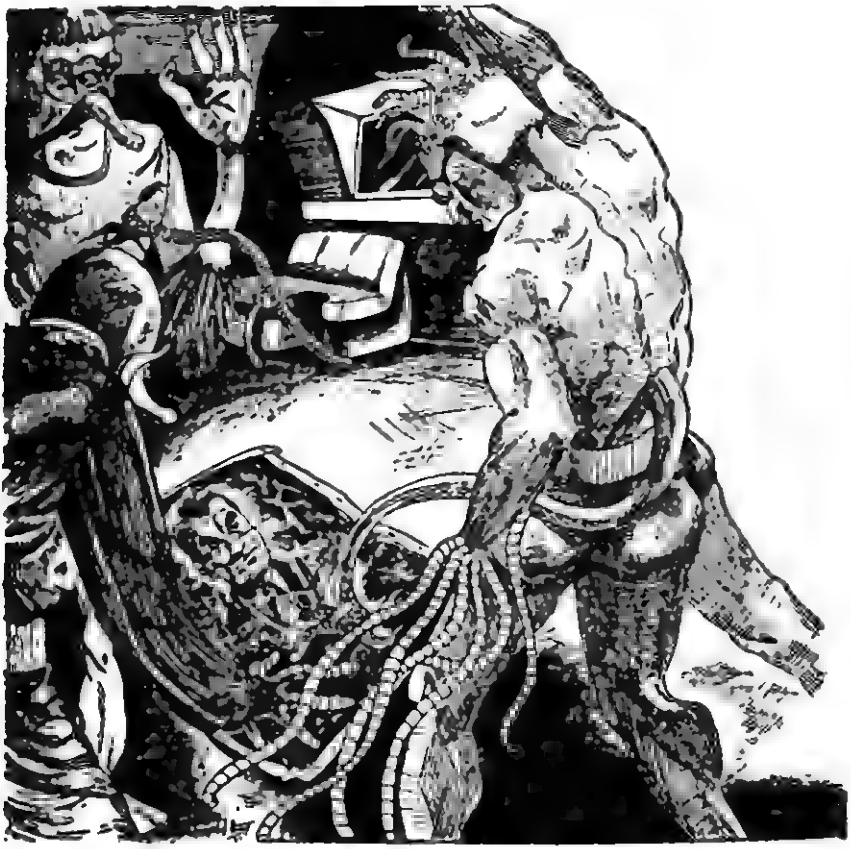
The result was surprising—and disappointing. None of the other nine planets lay anywhere near the line of transmission. The great mirrors appeared to be pointing blindly into space.

There seemed only one conclusion to be drawn, and Klarten was the first to voice it.

"They *had* interplanetary communication," he said. "But the station must be deserted now, and the transmitters no longer controlled. They haven't been switched off, and are just pointing where they were left."

"Well, we'll soon find out," said Orostron. "I'm going to land."

He brought the machine slowly down to the level of the great metal mirrors, and past them until it came to rest on the mountain rock. A hundred yards away, a white stone building crouched beneath the maze of steel girders. It was windowless, but there were several doors in the wall facing them.



Orostron watched his companions climb into their protective suits and wished he could follow. But someone had to stay in the machine to keep in touch with the mother ship. Those were Alveron's instructions, and they were very wise. One never knew what would happen on a world that was being explored for the first time, especially under conditions such as these.

Very cautiously, the three explorers stepped out of the air lock and adjusted the antigravity field of their suits. Then, each with the mode of locomotion peculiar to his race, the little party went towards the building, the Hansur twins leading and Klarten following close behind. His gravity control was apparently giving trouble, for he suddenly fell to the ground, rather to the amusement of his colleagues. Orostron saw them pause for a moment at the nearest door—then it opened and they disappeared from sight.

So Orostron waited, with what

patience he could, while the storm rose around him and the light of the aurora grew ever brighter in the sky. At the agreed times he called the mother ship and received brief acknowledgments from Rugon. He wondered how Torkalee was faring, halfway round the planet, but he could not contact him through the crash and thunder of solar interference.

It did not take Klarten and the Hansurs long to discover that their theories were largely correct. The building was a radio station, and it was deserted. It consisted of one tremendous room with a few small offices leading from it. In the main chamber, row after row of electrical equipment stretched into the distance; lights flickered and winked on hundreds of control panels, and a dull glow came from the elements in a great avenue of vacuum tubes.

But Klarten was not impressed. The first radio sets his race had built were now fossilized in strata a thousand million years old. Man, who had possessed electrical machines for only few centuries, could not compete with those who had known them for half the lifetime of the Earth.

Nevertheless, the party kept their recorders running as they explored the building. There was still one problem to be solved. The deserted station was broadcasting programs —but where were they coming from? The central switchboard had been quickly located. It was designed to handle scores of programs simultaneously, but the source of those programs was lost in a maze of cables that vanished underground. Back in the *S9000,* Rugon was trying to analyze the broadcasts and perhaps his researches would reveal their origin. It was impossible to trace cables that might lead across continents.

The party wasted little time at the deserted station. There was nothing they could learn from it, and they were seeking life rather than scientific information. A few minutes later the little ship rose swiftly from the plateau and headed towards the plains that must lie beyond the mountains. Less than three hours were still left to them.

As the array of enigmatic mirrors dropped out of sight, Orostron was struck by a sudden thought. Was it imagination, or had they all moved through a small angle while he had been waiting, as if they were still compensating for the rotation of the Earth? He could not be sure, and he dismissed the matter as unimportant. It would only mean that the directing mechanism was still working, after a fashion.

They discovered the city fifteen minutes later. It was a great, sprawling metropolis, built around a river that had disappeared leaving an ugly scar winding its way among the great buildings and beneath bridges that looked very incongruous now.

Even from the air, the city looked deserted. But only two and a half hours were left—there was no time for further exploration. Orostron made his decision, and landed near the largest structure he could see. It seemed reasonable to suppose

that some creatures would have sought shelter in the strongest buildings, where they would be safe until the very end.

The deepest coves—the heart of the planet itself—would give no protection when the final catacylsm came. Even if this race had reached the outer planets, its doom would only be delayed by the few hours it would take for the ravening wave-fronts to cross the Solar System.

Orostron could not know that the city had been deserted not for a few days or weeks, but for over a century. For the culture of cities, which had outlasted so many civilizations, had been doomed at last when the helicopter brought universal transportation. Within a few generations the great masses of mankind, knowing that they could reach any part of the globe in a matter of hours, had gone back to the fields and forests for which they had always longed. The new civilization had machines and resources of which earlier ages had never dreamed, but it was essentially rural and no longer bound to the steel and concrete warrens that had dominated the centuries before. Such cities that still remained were specialized centers of research, administration or entertainment; the others had been allowed to decay where it was too much trouble to destroy them. The dozen or so greatest of all cities, and the ancient university towns, had scarcely changed and would have lasted for many generations to come. But the cities that had been founded on steam and iron and surface transportation had passed with the industries that had nourished them.

And so while Orostron waited in the tender, his colleagues raced through endless empty corridors and deserted halls, taking innumerable photographs but learning nothing of the creatures who had used these buildings. There were libraries, meeting places, council rooms, thousands of offices—all were empty and deep with dust. If they had not seen the radio station on its mountain eyrie, the explorers could well have believed that this world had known no life for centuries.

Through the long minutes of waiting, Orostron tried to imagine where this race could have vanished. Perhaps they had killed themselves knowing that escape was impossible; perhaps they had built great shelters in the bowels of the planet, and even now were cowering in their millions beneath his feet, waiting for the end. He began to fear that he would never know.

It was almost a relief when at last he had to give the order for the return. Soon he would know if Torkalee's party had been more fortunate. And he was anxious to get back to the mother ship, for as the minutes passed the suspense had become more and more acute. There had always been the thought in his mind: "What if the astronomers of Kulath have made a mistake?" He would begin to feel happy when the walls of the *S9000* were around him. He would be happier still when they were out in space and

this ominous sun was shrinking far astern.

As soon as his colleagues had entered the air lock, Orostron hurled his tiny machine into the sky and set the controls to home on the *S9000*. Then he turned to his friends.

"Well, what have you found?" he asked.

Klarten produced a large roll of canvas and spread it out on the floor.

"This is what they were like," he said quietly. "Bipeds, with only two arms. They seem to have managed well, in spite of that handicap. Only two eyes as well, unless there are others in the back. We were lucky to find this; it's about the only thing they left behind."

The ancient oil painting stared stonily back at the three creatures regarding it so intently. By the irony of fate, its complete worthlessness had saved it from oblivion. When the city had been evacuated, no one had bothered to move Alderman John Richards, 1909—1974. For a century and a half he had been gathering dust while far away from the old cities the new civilization had been rising to heights no earlier culture had ever known.

"That was almost all we found," said Klarten. "The city must have been deserted for years. I'm afraid our expedition has been a failure. If there are any living beings on this world, they've hidden themselves too well for us to find them."

His commander was forced to agree.

"It was an almost impossible task," he said. "If we'd had weeks instead of hours we might have succeeded. For all we know, they may even have built shelters under the sea. No one seems to have thought of that."

He glanced quickly at the indicators and corrected the course.

"We'll be there in five minutes. Alveron seems to be moving rather quickly. I wonder if Torkalee has found anything?"

The *S9000* was hanging a few miles above the seaboard of a blazing continent when Orostron homed upon it. The danger line was thirty minutes away and there was no time to lose. Skillfully, he maneuvered the little ship into its launching tube and the party stepped out of the air lock.

There was a small crowd waiting for them. That was to be expected, but Orostron could see at once that something more than curiosity had brought his friends here. Even before a word was spoken, he knew that something was wrong.

"Torkalee hasn't returned. He's lost his party and we're going to the rescue. Come along to the control room at once."

From the beginning, Torkalee had been luckier than Orostron. He had followed the zone of twilight, keeping away from the intolerable glare of the sun, until he came to the shores of an inland sea. It was a very recent sea, one of the latest of Man's works, for the land it covered had been desert less than a century before. In a few hours

it would be desert again, for the water was boiling and clouds of steam were rising to the skies. But they could not veil the loveliness of the great white city that overlooked the tideless sea.

Flying machines were still parked neatly round the square in which Torkalee landed. They were disappointingly primitive, though beautifully finished, and depended on rotating airfoils for support. Nowhere was there any sign of life, but the place gave the impression that its inhabitants were not very far away. Lights were still shining from some of the windows.

Torkalee's three companions lost no time in leaving the machine. Leader of the party, by seniority of rank and race was T'sinadree, who like Alveron himself had been born on one of the ancient planets of the Central Suns. Next came Alarkane, from a race which was one of the youngest in the Universie and took a perverse pride in the fact. Last came one of the strange beings from the system of Palador. It was nameless, like all its kind, for it possessed no identity of its own, being merely a mobile but still dependent cell in the consciousness of its race. Though it and its fellows had long been scattered over the Galaxy in the exploration of countless worlds, some unknown link still bound them together as inexorably as the living cells in a human body.

When a creature of Palador spoke, the pronoun it used was always "We." There was not, nor could there ever be, any first person singular in the language of Palador.

The great doors of the splendid building baffled the explorers, though any human child would have known their secret. T'sinadree wasted no time on them but called Torkalee on his personal transmitter. Then the three hurried aside while their commander maneuvered his machine into the best position. There was a brief burst of intolerable flame; the massive steelwork flickered once at the edge of the visible spectrum and was gone. The stones were still glowing when the eager party hurried into the building, the beams of their light projectors fanning before them.

The torches were not needed. Before them lay a great hall, glowing with light from lines of tubes along the ceiling. On either side, the hall opened out into long corridors, while straight ahead a massive stairway swept majestically towards the upper floors.

For a moment T'sinadree hesitated. Then, since one way was as good as another, he led his companions down the first corridor.

The feeling that life was near had now become very strong. At any moment, it seemed, they might be confronted by the creatures of this world. If they showed hostility—and they could scarcely be blamed if they did—the paralyzers would be used at once.

The tension was very great as the party entered the first room, and only relaxed when they saw that it held nothing but machines—row after row of them, now stilled and

silent. Lining the enormous room were thousands of metal filing cabinets, forming a continuous wall as far as the eye could reach. And that was all; there was no furniture, nothing but the cabinets and the mysterious machines.

Alarkane, always the quickest of the three, was already examining the cabinets. Each held many thousand sheets of tough, thin material, perforated with innumerable holes and slots. The Paladorian appropriated one of the cards and Alarkane recorded the scene together with some close-ups of the machines. Then they left. The great room, which had been one of the marvels of the world, meant nothing to them. No living eye would ever again see that wonderful battery of almost human Hollerith analyzers and the five thousand million punched cards holding all that could be recorded of each man, woman and child on the planet.

It was clear that this building had been used very recently. With growing excitement, the explorers hurried on to the next room. This they found to be an enormous library, for millions of books lay all around them on miles and miles of shelving. Here, though the explorers could not know it, were the records of all the laws that Man had ever passed, and all the speeches that had ever been made in his council chambers.

T'sinadree was deciding his plan of action when Alarkane drew his attention to one of the racks a hundred yards away. It was half empty, unlike all the others. Around it books lay in a tumbled heap on the floor, as if knocked down by someone in frantic haste. The signs were unmistakable. Not long ago, other creatures had been this way. Faint wheel marks were clearly visible on the floor to the acute sense of Alarkane, though the others could see nothing. Alarkane could even detect footprints, but knowing nothing of the creatures that had formed them he could not say which way they led.

The sense of nearness was stronger than ever now, but it was nearness in time, not in space. Alarkane voiced the thoughts of the party.

"Those books must have been valuable, and someone has come to rescue them—rather as an afterthought, I should say. That means there must be a place of refuge, possibly not very far away. Perhaps we may be able to find some other clues that will lead us to it."

T'sinadree agreed, but the Paladorian refused to be enthusiastic.

"That may be so," it said, "but the refuge may be anywhere on the planet, and we have just two hours left. Let us waste no more time if we hope to rescue these people."

The party hurried forward once more, pausing only to collect a few books that might be useful to the scientists at Base—though it was doubtful if they could ever be translated. They soon found that the great building was composed largely of small rooms, all showing signs of recent occupation. Most of them

were in a neat and tidy condition, but one or two were very much the reverse. The explorers were particularly puzzled by one room—clearly an office of some kind—that appeared to have been completely wrecked. The floor was littered with papers, the furniture had been smashed, and smoke was pouring through the broken windows from the fires outside.

T'sinadree was rather alarmed.

"Surely no dangerous animal could have got into a place like this!" he exclaimed, fingering his paralyzer nervously.

Alarkane did not answer. He began to make that annoying sound which his race called "laughter." It was several minutes before he would explain what had amused him.

"I don't think any animal has done it," he said. "In fact, the explanation is very simple. Suppose you had been working all your life in this room, dealing with endless papers, year after year. And suddenly, you are told that you will never see it again, that your work is finished, and that you can leave it forever. More than that—no one will come after you. *Everything* is finished. How would you make your exit, T'sinadree?"

The other thought for a moment.

"Well, I suppose I'd just tidy things up and leave. That's what seems to have happened in all the other rooms."

Alarkane laughed again.

"I'm quite sure you would. But some individuals have a different psychology. I think I should have liked the creature that used this room."

He did not explain himself further, and his two colleagues puzzled over his words for quite a while before they gave it up.

It came as something of a shock when Torkalee gave the order to return. They had gathered a great deal of information, but had found no clue that might lead them to the missing inhabitants of this world. That problem was as baffling as ever, and now it seemed that it would never be solved. There were only forty minutes left before the *S9000* would be departing.

They were halfway back to the tender when they saw the semicircular passage leading down into the depths of the building. Its architectural style was quite different from that used elsewhere, and the gently sloping floor was an irresistible attraction to creatures whose many legs had grown weary of the marble staircases which only bipeds could have built in such profusion. T'sinadree had been the worst sufferer, for he normally employed twelve legs and could use twenty when he was in a hurry—though no one had ever seen him perform this feat.

The party stopped dead and looked down the passageway with a single thought. *A tunnel, leading down into the depths of the earth.* At its end, they might yet find the people of this world and rescue some of them from their fate. For there was still time to call the mother ship if the need arose.

T'sinadrel signaled to his commander and Torkalee brought the little machine immediately overhead. There might not be time for the party to retrace its footsteps through the maze of passages, so meticulously recorded in the Paladorian mind that there was no possibility of going astray. If speed were necessary, Torkalee could blast his way through the dozen floors above their head. In any case, it should not take long to find what lay at the end of the passage.

It took only thirty seconds. The tunnel ended quite abruptly in a very curious cylindrical room with magnificently padded seats along the walls. There was no way out save that by which they had come and it was several seconds before the purpose of the chamber dawned on Alarkane's mind. It was a pity, he thought, that they would never

have time to use this. The thought was suddenly interrupted by a cry from T'sinadree. Alarkane wheeled around, and saw that the entrance had closed silently behind them.

Even in that first moment of panic, Alarkane found himself thinking with some admiration: "Whoever they were, they knew how to build automatic machinery!"

The Paladorian was the first to speak. It waved one of its tendrils towards the seats.

"We think it would be best to be seated," it said. The multiplex mind of Palador had already analyzed the situation and knew what was coming.

They did not have long to wait before a low-pitched hum came from a grille overhead, and for the very last time in history a human, even if lifeless, voice was heard on Earth. The words were meaningless, though the trapped explorers could guess their message clearly enough.

"Chose your stations, please, and be seated."

Simultaneously, a wall panel at one end of the compartment glowed with light. On it was a simple map, consisting of a series of a dozen circles connected by a line. Each of the circles had writing alongside it, and beside the writing were two buttons of different colors.

Alarkane looked questioningly at his leader.

"Don't touch them," said T'sinadree. "If we leave the controls, alone, the doors may open again."

He was wrong. The engineers who had designed the automatic subway had assumed that anyone who entered it would naturally wish to go somewhere. If they selected no intermediate station, their destination could only be the end of the line.

There was another pause while the relays and thyratrons, waited for their orders. In those thirty seconds, if they had known what to do, the party could have opened the doors and left the subway. But they did not know, and the machines geared to a human psychology acted for them.

The surge of acceleration was not very great; the lavish upholstery was a luxury, not a necessity. Only an almost imperceptible vibration told of the speed at which they were traveling through the bowels of the earth, on a journey the duration of which they could not even guess. And in thirty minutes, the *S9000* would be leaving the Solar System.

There was a long silence in the speeding machine. T'sinadree and Alarkane were thinking rapidly. So was the Paladorian, though in a different fashion. The conception of personal death was meaningless to it, for the destruction of a single unit meant no more to the group-mind than the loss of a nail-paring to a man. But it could, though with great difficulty, appreciate the plight of individual intelligences such as Alarkane and T'sinadree, and it was anxious to help them if it could.

Alarkane had managed to contact Torkalee with his personal transmitter, though the signal was very weak and seemed to be fading

quickly. Rapidly he explained the situation, and almost at once the signals became clearer. Torkalee was following the path of the machine, flying above the ground under which they were speeding to their unknown destination. That was the first indication they had of the fact that they were traveling at nearly a thousand miles an hour, and very soon after that Torkalee was able to give the still more disturbing news that they were rapidly approaching the sea. While they were beneath the land, there was a hope, though a slender one, that they might stop the machine and escape. But under the ocean—not all the brains and the machinery in the great mother ship could save them. No one could have devised a more perfect trap.

T'sinadree had been examining the wall map with great attention. Its meaning was obvious, and along the line connecting the circles a tiny spot of light was crawling. It was already halfway to the first of the stations marked.

"I'm going to press one of those buttons," said T'sinadree at last. "It won't do any harm, and we may learn something."

"I agree. Which will you try first?"

"There are only two kinds, and it won't matter if we try the wrong one first. I suppose one is to start the machine and the other is to stop it."

Alarkane was not very hopeful.

"It started without any button pressing," he said. "I think it's completely automatic and we can't control it from here at all."

T'sinadree could not agree.

"These buttons are clearly associated with the stations, and there's no point in having them unless you can use them to stop yourself. The only question is, which is the right one?"

His analysis was perfectly correct. The machine could be stopped at any intermediate station. They had only been on their way ten minutes, and if they could leave now, no harm would have been done. It was just bad luck that T'sinadree's first choice was the wrong button.

The little light on the map crawled slowly through the illuminated circle without checking its speed. And at the same time Torkalee called from the ship overhead.

"You have just passed underneath a city and are heading out to sea. There cannot be another stop for nearly a thousand miles."

Alveron had given up all hope of finding life on this world. The *S9000* had roamed over half the planet, never staying long in one place, descending ever and again in an effort to attract attention. There had been no response; Earth seemed utterly dead. If any of its inhabitants were still alive, thought Alveron, they must have hidden themselves in its depths where no help could reach them, though their doom would be none the less certain.

Rugon brought news of the disaster. The great ship ceased its

fruitless searching and fled back through the storm to the ocean above which Torkalee's little tender was still following the track of the buried machine.

The scene was truly terrifying. Not since the days when Earth was born had there been such seas as this. Mountains of water were racing before the storm which had now reached velocities of many hundred miles an hour. Even at this distance from the mainland the air was full of flying debris—trees, fragments of houses, sheets of metal, anything that had not been anchored to the ground. No airborne machine could have lived for a moment in such a gale. And ever and again even the roar of the wind was drowned as the vast water-mountains met head-on with a crash that seemed to shake the sky.

Fortunately, there had been no serious earthquakes yet. Far beneath the bed of the ocean, the wonderful piece of engineering which had been the world president's private vacuum-subway was still working perfectly, unaffected by the tumult and destruction above. It would continue to work until the last minute of the Earth's existence, which, if the astronomers were right, was not much more than fifteen minutes away—though precisely how much more, Alveron would have given a great deal to know. It would be nearly an hour before the trapped party could reach land and even the slightest hope of rescue.

Alveron's instructions had been precise, though even without them he would never have dreamed of taking any risks with the great machine that had been intrusted to his care. Had he been human, the decision to abandon the trapped members of his crew would have been desperately hard to make. But he came of a race far more sensitive than Man, a race that so loved the things of the spirit that long ago, and with infinite reluctance, it had taken over control of the Universe since only thus could it be sure that justice was being done. Alveron would need all his superhuman gifts to carry him through the next few hours.

Meanwhile, a mile below the bed of the ocean Alarkane and T'sinadree were very busy indeed with their private communicators. Fifteen minutes is not a long time in which to wind up the affairs of a lifetime. It is indeed, scarcely long enough to dictate more than a few of those farewell messages which at such moments are so much more important than all other matters.

All the while the Paladorian had remained silent and motionless, saying not a word. The other two, resigned to their fate and engrossed in their personal affairs, had given it no thought. They were startled when suddenly it began to address them in its peculiarly passionless voice.

"We perceive that you are making certain arrangements concerning your anticipated destruction. That will probably be unnecessary. Captain Alveron hopes to rescue us if we can stop this machine when we reach land again."

Both T'sinadree and Alarkane were too surprised to say anything for a moment. Then the latter gasped, "How do you know?"

It was a foolish question for he remembered at once that there were several Paladorians—if one could use the phrase—in the *S9000,* and consequently their companion knew everything that was happening in the mother ship. So he did not wait for an answer but continued: "Alveron can't do that! He daren't take such a risk!"

"There will be no risk," said the Paladorian. "We have told him what to do. It is really very simple."

Alarkane and T'sinadree looked at their companion with something approaching awe, realizing now what must have happened. In moments of crisis, the single units comprising the Paladorian mind could link together in an organization no less close than that of any physical brain. At such moments they formed an intellect more powerful than any other in the Universe. All ordinary problems could be solved by a few hundred or thousand units. Very rarely millions would be needed, and on two historic occasions the billions of cells of the entire Paladorian consciousness had been welded together to deal with emergencies that threatened the race. The mind of Palador was one of the greatest mental resources of the Universe; its full force was seldom required, but the knowledge that it was available was supremely comforting to other races. Alarkane wondered how many cells had co-ordinated to deal with this particular emergency. He also wondered how so trivial an incident had ever come to its attention at all.

To that question he was never to know the answer, though he might have guessed it had he known that the chillingly remote Paladorian mind possessed an almost human streak of vanity. Long ago, Alarkane had written a book trying to prove that eventually all intelligent races would sacrifice individual consciousness and that one day only group-minds would remain in the Universe. Palador, he had said, was the first of those ultimate intellects, and the vast, dispersed mind had not been displeased.

They had no time to ask any further questions before Alveron himself began to speak through their communicators.

"Alveron calling! We're staying on this planet until the detonation wave reaches it, so we may be able to rescue you. You're heading towards a city on the coast which you'll reach in forty minutes at your present speed. If you cannot stop yourselves then, we're going to blast the tunnel behind and ahead of you to cut off your power. Then we'll sink a shaft to get you out—the chief engineer says he can do it in five minutes with the main projectors. So you should be safe within an hour, unless the sun blows up before."

"And if that happens, you'll be destroyed as well! You mustn't take such a risk!"

"Don't let that worry you; we're perfectly safe. When the sun detonates, the explosion wave will take several minutes to rise to its maximum. But apart from that, we're on the night side of the planet, behind an eight-thousand-mile screen of rock. When the first warning of the explosion comes, we will accelerate out of the Solar System, keeping in the shadow of the planet. Under our maximum drive, we will reach the velocity of light before leaving the cone of shadow, and the sun cannot harm us then."

T'sinadree was still afraid to hope. Another objection came at once into his mind.

"Yes, but how will you get any warning, here on the night side of the planet?"

"Very easily," replied Alverson. "This world has a moon which is now visible from this hemisphere. We have telescopes trained on it. If it shows any sudden increase in brilliance, our main drive goes on automatically and we'll be thrown out of the system."

The logic was flawless. Alveron, cautious as ever, was taking no chances. It would be many minutes before the eight-thousand-mile shield of rock and metal could be destroyed by the fires of the exploding sun. In that time, the *S9000* could have reached the safety of the velocity of light.

Alarkane pressed the second button when they were still several miles from the coast. He did not expect anything to happen then, assuming that the machine could not stop between stations. It seemed too good to be true when, a few minutes later, the machine's slight vibration died away and they came to a halt.

The doors slid silently apart. Even before they were fully open, the three had left the compartment. They were taking no more chances. Before them a long tunnel stretched into the distance rising slowly out of sight. They were starting along it when suddenly Alveron's voice called from the communicators.

"Stay where you are! We're going to blast!"

The ground shuddered once, and far ahead there came the rumble of falling rock. Again the earth shook—and a hundred yards ahead the passageway vanished abruptly. A tremendous vertical shaft had been cut clean through it.

The party hurried forward again until they came to the end of the corridor and stood waiting on its lip. The shaft in which it ended was a full thousand feet across and descended into the earth as far as the torches could throw their beams. Overhead, the storm clouds fled beneath a moon that no man would have recognized, so luridly brilliant was its disk. And, most glorious of all sights, the *S9000* floated high above, the great projectors that had drilled this enormous pit still glowing cherry red.

A dark shape detached itself from the mother ship and dropped swiftly towards the ground. Torkalee was returning to collect his friends. A little later, Alveron

greeted them in the control room. He waved to the great vision screen and said quietly:

"You see, we were only just in time."

The continent below them was slowly settling beneath the mile-high waves that were attacking its coasts. The last that anyone was ever to see of Earth was a great plain, bathed with the silver light of the abnormally brilliant moon. Across its face the waters were pouring in a glittering flood towards a distant range of mountains. The sea had won its final victory, but its triumph would be short-lived for soon sea and land would be no more. Even as the silent party in the control room watched the destruction below, the infinitely greater catastrophe to which this was only the prelude came swiftly upon them.

It was as though dawn had broken suddenly over this moonlit landscape. But it was not dawn: it was only the moon, shining with the brilliance of a second sun. For perhaps thirty seconds that awesome, unnatural light burnt fiercely on the doomed land beneath. Then there came a sudden flashing of indicator lights across the control board. The main drive was on. For a second Alveron glanced at the indicators and checked their information. When he looked again at the screen, Earth was already gone.

The magnificent, desperately overstrained generators quietly died when the *S9000* was passing the orbit of Persephone. It did not matter, the sun could never harm them now, and although the ship was speeding helplessly out into the lonely night of interstellar space, it would only be a matter of days before rescue came.

There was irony in that. A day ago, they had been the rescuers, going to the aid of a race that now no longer existed. Not for the first time Alveron wondered about the world that had just perished. He tried, in vain, to picture it as it had been in its glory, the streets of its cities thronged with life. Primitive though its people had been, they might have offered much to the Universe later in history. If only they could have made contact! Regret was useless: long before their coming, the people of this world must have buried themselves in its iron heart. And now they and their civilization would remain a mystery for the rest of time.

*

Alveron was glad when his thoughts were interrupted by Rugon's entrance. The chief of communications had been very busy ever since the take-off, trying to analyze the programs radiated by the transmitter Orostron had discovered. The problem was not a difficult one, but it demanded the construction of special equipment, and that had taken time.

"Well, what have you found?" asked Alveron.

"Quit a lot," replied his friend. "There's something mysterious here, and I don't understand it.

"It didn't take long to find how the vision transmissions were built up, and we've been able to convert

them so suit our own equipment. It seems that there were cameras all over the planet, surveying points of interest. Some of them were apparently in cities, on the tops of very high buildings. The cameras

were rotating continuously to give panoramic views. In the programs we've recorded there are about twenty different scenes.

"In addition, there are a number of transmissions of a different kind, neither sound nor vision. They seem to be purely scientific—possibly instrument readings or something of that sort. All these programs were going out simultaneously on different frequency bands.

"Now there must be a reason for all this. Orostron still thinks that the station simply wasn't switched off when it was deserted. But these aren't the sort of programs such a station would normally radiate at all. It was certainly used for interplanetary relaying—Klarten was quite right there. So these people must have crossed space, since none of the other planets had any life at the time of the last survey. Don't you agree?"

Alveron was following intently.

"Yes, that seems reasonable enough. But it's also certain that the beam was pointing to none of the other planets. I checked that myself."

"I know," said Rugon. "What I want to discover is why a giant interplanetary relay station is busily transmitting pictures of a world about to be destroyed—*pictures that would be of immense interest to scientists and astronomers.* Someone had gone to a lot of trouble to arrange all those panoramic cameras. I am convinced that those beams were going *somewhere.*"

Alveron started up.

"Do you imagine that there might be an outer planet that hasn't been reported?" he asked. "If so, your theory's certainly wrong. The beam wasn't even pointing in the plane of the Solar System. And even if it were—just look at this."

He switched on the vision screen and adjusted the controls. Against the velvet curtain of space was hanging a blue-white sphere, apparently composed of many concentric shells of incandescent gas. Even though its immense distance made all movement invisible, it was clearly expanding at an enormous rate. At its center was a blinding point of light—the white dwarf star that the sun had now become.

"You probably don't realize just how big that sphere is," said Alveron. "Look at this."

He increased the magnification until only the center portion of the nova was visible. Close to its heart were two minute condensations, one on either side of the nucleus.

"Those are the two giant planets of the system. They have still managed to retain their existence—after a fashion. And they were several hundred million miles from the sun.

"The nova is still expanding—but it's already twice the size of the Solar System."

Rugon was silent for a moment.

"Perhaps you're right," he said, rather grudgingly. "You've disposed of my first theory. But you still haven't satisfied me."

He made several swift circuits of the room before speaking again. Alveron waited patiently, he knew

the almost intuitive powers of his friend, who could often solve a problem when mere logic seemed insufficient.

Then, rather slowly, Rugon began to speak again.

"What do you think of this?" he said. "Suppose we've completely underestimated this people? Orostron did it once—he thought they could never have crossed space, since they'd only known radio for two centuries. Hansur II told me that. Well, Orostron was quite wrong. Perhaps we're all wrong. I've had a look at the material that Klarten brought back from the transmitter. He wasn't impressed by what he found, but it's a marvelous achievement for so short a time. There were devices in that station that belonged to civilizations thousands of years older. *Alveron, can we follow that beam to see where it leads?*"

Alveron said nothing for a full minute. He had been more than half expecting the question, but it was not an easy one to answer. The main generators had gone completely. There was no point in trying to repair them. But there was still power available, and while there was power, anything could be done in time. It would mean a lot of improvisation, and some difficult maneuvers, for the ship still had its enormous initial velocity. Yes, it could be done, and the activity would keep the crew from becoming further depressed, now that the reaction caused by the mission's failure had started to set in. The news that the nearest heavy repair ship could not reach them for three weeks had also caused a slump in morale.

The engineers, as usual, made a tremendous fuss. Again as usual, they did the job in half the time they had dismissed as being absolutely impossible. Very slowly, over many hours, the great ship began to discard the speed its main drive had given it in as many minutes. In a tremendous curve, millions of miles in radius, the *S9000* changed its course and the star fields shifted round it.

The maneuver took three days, but at the end of that time the ship was limping along a course parallel to the beam that had once come from Earth. They were heading out into emptiness, the blazing sphere that had been the sun dwindling slowly behind them. By the standards of interstellar flight, they were almost stationary.

For hours Rugon strained over his instruments, driving his detector beams far ahead into space. There were certainly no planets within many light-years; there was no doubt of that. From time to time Alveron came to see him and always he had to give the same reply: "Nothing to report." About a fifth of the time Rugon's intuition let him down badly; he began to wonder if this were such an occasion.

Not until a week later did the needles of the mass-detectors quiver feebly at the ends of their scales. But Rugon said nothing, not even to his captain. He waited until he

was sure, and he went on waiting until even the short-range scanners began to react, and to build up the first faint pictures on the vision screen. Still he waited patiently until he could interpret the images. Then, when he knew that his wildest fancy was even less than the truth, he called his colleagues into the control room.

The picture on the vision screen was the familiar one of endless star fields, sun beyond sun to the very limits of the Universe. Near the center of the screen a distant nebula made a patch of haze that was difficult for the eye to grasp.

Rugon increased the magnification. The stars flowed out of the field; the little nebula expanded until it filled the screen and then—it was a nebula no longer. A simultaneous gasp of amazement came from all the company at the sight that lay before them.

Lying across league after league of space, ranged in a vast three dimensional array of rows and columns with the precision of a marching army, were thousands of tiny pencils of light. They were moving swiftly; the whole immense lattice holding its shape as a single unit. Even as Alveron and his comrades watched, the formation began to drift off the screen and Rugon had to recenter the controls.

After a long pause, Rugon started to speak.

"This is the race," he said softly, "that has only known radio for two centuries—the race that we believed had crept to die in the heart of its planet. I have examined

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"That is the greatest fleet of which there has even been a record. Each of those points of light represents a ship larger than our own. Of course, they are very primitive—what you see on the screen are the jets of their rockets. Yes, they dared to use rockets to bridge interstellar space! You realize what that means. It would take them centuries to reach the nearest star. The whole race must have embarked on this journey in the hope that its descendants would complete it, generations later.

"To measure the extent of their accomplishment, think of the ages it took us to conquer space, and the longer ages still before we attempted to reach the stars. Even if we were threatened with annihilation, could we have done so much in so short a time? Remember, this is the youngest civilization in the Universe. Four hundred thousand years ago it did not even exist. What will it be a million years from now?"

An hour later, Orostron left the crippled mother ship to make contact with the great fleet ahead. As the little torpedo disappeared among the stars, Alveron turned to his friend and made a remark that Rugon was often to remember in the years ahead.

"I wonder what they'll be like?" he mused. "Will they be nothing but wonderful engineers, with no art or philosophy? They're going to have such a surprise when Orostron reaches them—I expect it will be rather a blow to their pride. It's funny how all isolated races think they're the only people in the Universe. But they should be grateful to us—we're going to save them a good many hundred years of travel."

Alveron glanced at the Milky Way, lying like a veil of silver mist across the vision screen. He waved towards it with a sweep of a tentacle that embraced the whole circle of the Galaxy, from the Central Planets to the lonely suns of the Rim.

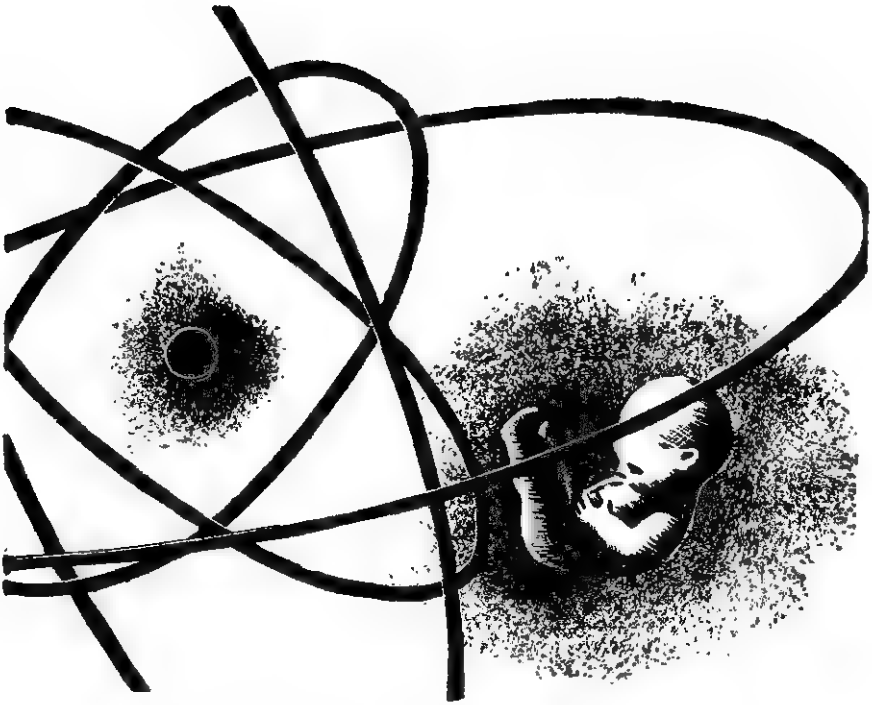
"You know," he said to Rugon, "I feel rather afraid of these people. Suppose they don't like our little Federation?" He waved once more towards the star-clouds that lay massed across the screen, glowing with the light of their countless suns.

"Something tells me they'll be very determined people," he added. "We had better be polite to them. After all, we only outnumber them about a thousand million to one."

Rugon laughed at his captain's little joke.

Twenty years afterwards, the remark didn't seem so funny.

THE END.



A Son Is Born

by A. E. VAN VOGT

Van Vogt starts a new series, of a world where atomic energy is old—and science forgotten, debased to ritual. A world into which a child touched by atomic rays is born—

Illustrated by Swenson

Junior scientists stood at the bell ropes all day, ready to sound forth the tidings of an important birth. By night time, they were exchanging coarse jests as to the possible reason for the delay. They took care, however, not to be overheard by seniors or initiates.

The expected child had actually been born a few hours after dawn. He was a weak and sickly fellow, and he showed certain characteris-

tics that brought immediate dismay to the Leader household. His mother, Lady Tania, when she wakened, listened for a while to his piteous crying, then commented acidly:

"Who frightened the little wretch? He seems already afraid of life."

Scientist Joquin, in charge of the delivery, considered her words an ill-omen. He had not intended to let her see the monstrosity until the following day, but now it seemed to him that he must act swiftly to avert calamity. He hurriedly sent a dozen slave women to wheel in the carriage, ordering them to group around it in close formation to ward off any malignant radiation that might be in the bedroom.

Lady Tania was lying, her slim body propped up in bed, when the astonishing procession started to squeeze through the door. She watched it with a frown of amazement and then the beginning of alarm. She had patiently borne her husband three other children, and so she knew that what she was seeing was not part of any normal observance. She was not a soft spoken creature, and even the presence of a Scientist in the room did not restrain her. She said violently:

"What is going on here, Joquin?"

Joquin fluttered his head at her in distress. Did she not realize that every ill-tempered word spoken at this period only doomed the handicapped child to further disasters? He noted, startled, that she was parting her lips to speak again —and, with a silent prayer to the atom gods, he took his life in his hands.

Three swift strides he made towards the bed, and clapped his palm over her mouth. As he had expected, the woman was too astounded by the action to utter a sound. By the time she recovered, and began to struggle weakly, the carriage was being tilted. And over his arm, she had her first glimpse of the baby.

The gathering storm faded from her blue eyes. After a moment, Joquin gently removed his hand from her mouth, and slowly retreated beyond the carriage. He stood there, quailing with the thought of what he had done, but gradually as no verbal lightning struck at him from the bed, his sense of righteousness reasserted. He began to glow inwardly and ever afterwards claimed that what he had done saved the situation as far as it could be saved. In the warmth of that self-congratulatory feeling, he almost forgot the child.

He was recalled by the Lady Tania saying in a dangerously quiet tone:

"How did it happen?"

Joquin nearly made the mistake of shrugging. He caught himself in time, but before he could say anything, the woman said, more sharply:

"Of course, I know it's due to the atom gods. But *when* do you think it happened?"

Joquin was cautious. The scientists of the temples had had much

experience with atomic mutation, enough to know that the controlling gods were erratic and not easily pinned down by dates. Nevertheless, mutation did not occur after an embryo baby was past the fish stage, and therefore a time limit could be estimated. Not after January, 470 A.B., and not before — He paused, recalling the approximate birth date of the Lady Tania's third child. He completed his figuring aloud— "Not before 467 A.B."

The woman was looking at the child now, more intently. What she saw made her swallow visibly. Joquin, watching her, thought he knew what she was thinking. She had made the mistake a few days before her confinement of boasting in a small company that four children would give her an advantage over her sister, Chrosone, who only had two children, and over her stepbrother, Lord Tews, whose acid-tongued wife had borne him three children. Now, the advantage would be theirs, for, obviously, she could have no more normal children, and they could overtake or surpass her at their leisure.

There would also be many witty exchanges at her expense. The potentialities for personal embarrassment were actually almost endless.

All that, Joquin read in her face, as she stared with hardening eyes at the child. He said hurriedly:

"This is the worst stage, Lady. Frequently, the result after a few months or years is reasonably—satisfactory."

He had almost said "human." He was aware of her gaze swinging towards him. He waited uneasily, but all she said finally was:

"Has the Lord Leader, the child's grandfather, been in?"

Joquin inclined his head. "The Lord Leader saw the baby a few minutes after it was born. His only comment was to the effect that I should ascertain from you, if possible, when you were affected."

She did not reply immediately, but her eyes narrowed even more. Her thin face grew hard, then harsh. She looked up at the scientist at last.

"I suppose you know," she said, "that only negligence at one of the temples could be responsible."

Joquin had already thought of that, but now he looked at her uneasily. Nothing had ever been done about previous "children of the gods," but it had been growing on him that the Linns at least regarded this as a special case. He said slowly:

"The atom gods are inscrutable."

The woman seemed not to hear. Her cold voice went on:

"The child will have to be destroyed, I suppose. But you may be sure that, within a month, there will be a compensatory stretching of scientific necks such as the world has not seen in a generation."

She was not a pleasant person when roused, the Lady Tania Linn, daughter-in-law of the Lord Leader.

It proved easy to trace the source of the mutation. The previous summer, Tania, tiring of a holiday

on one of the family's west coast estates, returned to the capitol before she was expected. Her husband, General of the Realm Creg Linn, was having extensive alterations made to the Hill Palace. No invitation was forthcoming from her sister at the other end of the city, or from her stepmother-in-law, the wife of the Lord Leader. Tania, perforce, moved into an apartment in the Town Palace.

This assortment of buildings, though still maintained by the state, had not been used as a residence for several years. The city had grown immense since it was built, and long since the commercial houses had crowded around it. Due to a lack of foresight, by an earlier generation, title had not been taken to the lands surrounding the palace, and it had always been deemed unwise to seize them by force.

There was one particularly annoying aspect of the failure to realize the profitable potentialities of the area. This was the scientists' temple that towered in the shelter of one wing of the palace. It had caused the Lady Tania no end of heartache the previous summer. On taking up residence, she discovered that the only habitable apartment was on the temple side, and that the three most gorgeous windows faced directly onto the blank lead walls of the temple.

The scientist who had built the temple was a member of the Raheinl group, hostile to the Linns. It had titillated the whole city when the site was made known. The fact that three acres of ground were available made the affront obvious.

It still rankled.

The agents of the Lord Leader discovered at the first investigation that one small area of the lead wall of the temple was radioactive. They were unable to determine the reason for the activity, because the wall at that point was of the required thickness. But the fact was what they reported to their master. Before midnight of the second day after the child was born, the decision was in the making.

Shortly before twelve, Scientist Joquin was called in, and told the trend of events. Once more he took his life in his hands.

"Leader," he said, addressing the great man direct, "this is a grave error into which your natural irritation is directing you. The scientists are a group, who, having full control of atomic energy dispensation, have developed an independent attitude of mind, which will not take kindly to punishments for accidental crimes. My advice is, leave the boy alive, and consult with the Scientists' Council. I will advise them to remove the temple of their own volition, and I feel sure they will agree."

Having spoken, Joquin glanced at the faces before him. And realized that he had made a mistake in his initial assumption. There were two men and three women in the room. The men were the grave, lean Lord Leader and the plumpish Lord Tews, who was the Lady Leader's eldest son by her first marriage. Lord Tews was acting General of the Realm in the absence of

Lord Creg, Tania's husband, who was away fighting the Venusians on Venus.

The women present were the Lady Leader Linn, wife of the Lord Leader, and stepmother-in-law to the two other women, Chrosone, Tania's sister and Lady Tania, still in bed. The Lady Tania and her sister were not on speaking terms, for a reason that need not be gone into here.

Joquin assumed that these five had called him for consultation, as they had on past occasions. Now, looking at them, realization came that their interest in him was psychological rather than logical. They listened intently to his words, but what he said apparently merely confirmed their previously held opinion.

Lord Tews looked at his mother, a faint smile on his plumpish face. She half lowered her eyelids. The two sisters remained frozen faced, staring at Joquin. The Lord Leader ended the tension by nodding a dismissal to the scientist.

Joquin went out, quivering. The wild idea came, to send a warning to the endangered temple scientists. But he quickly abandoned that as hopeless. No message from him would be allowed out of the palace.

He retired finally, but he was unable to sleep. In the morning, the fearful rescript that he had visualized all through the night was posted on the military board, for all to read. Joquin blinked at it palely. It was simple and without qualification.

It commanded that every scientist of the Raheinl temple was to be hanged before dusk. The property was ordered seized, and the buildings razed to the ground. The three acres of temple land were to be converted into a park.

It did not say that the park was to be added to the Town Palace of the Linns, though this later turned out to be the fact.

The rescript was signed in the firm hand of the Lord Leader himself.

Reading it, Joquin recognized that a declaration of war had been made against the power of the temple scientists.

The Scientist Alden was not a man who had premonitions. And certainly he had none as he walked slowly along towards the Raheinl temple.

The morning glowed around him. The sun was out. A gentle breeze blew along the avenue of palms which stalked in stately fashion past his new home. In his mind was the usual cozy kaleidoscope of happy reminiscences, and a quiet joy that a simple country scientist had in only ten years become the chief scientist of the Raheinl temple.

There was but one tiny flaw in that memory, and that was the real reason for his swift promotions. More than eleven years ago, he had remarked to another junior that, since the gods of the atom had yielded certain secrets of mechanical power to human beings, it might be worthwhile to cajole them by experimental methods into revealing others. And that, after all, there might be a grain of truth in the

vague legends about cities and planets ablaze with atomic power and light.

Alden shuddered involuntarily at the brief remembrance. It was only gradually that he realized the extent of his blasphemy. And when the other junior coolly informed him the following day that he had told the chief scientist—that had seemed like the end of all his hopes.

Surprisingly, it turned out to be the beginning of a new phase in his career. Within a month he was called for his first private conversation with a visiting scientist, Joquin, who lived in the palace of the Linns.

"It is our policy," Joquin said, "to encourage young men whose thoughts do not move entirely in a groove. We know that radical ideas are common to young people, and that, as a man grows older, he attains a balance between his inward self and the requirements of the world.

"In other words," the scientist finished, smiling at the junior, "have your thoughts but keep them to yourself."

It was shortly after this that Alden was posted to the east coast. From there, a year later, he went to the capital. As he grew older, and gained power, he discovered that radicalism among the young men was much rarer than Joquin had implied.

The years of ascendancy brought awareness of the foolishness of what he had said. At the same time, he felt a certain pride in the words, a feeling that they made him "different" from, and so superior to, the other scientists.

As chief he discovered that radicalism was the sole yardstick by which his superiors judged a candidate for promotion. Only those recommendations which included an account of unusual thinking on the part of the aspirant, however slight the variance from the norm, were ever acted upon. The limitation had one happy effect. In the beginning, his wife, anxious to be the power behind the power at the temple, declared herself the sole arbiter as to who would be urged for promotion. The young temple poets visited her when Alden was not around, and read their songs to her privately.

And then they discovered that her promises meant nothing. Their visits ceased. Alden had peace in his home, and a wife suddenly become considerably more affectionate.

His reverie ended. There was a crowd ahead, and cries. He saw that people were swarming around the Raheinl temple. Alden thought blankly, "An accident?"

He hurried forward pushing through the outer fringes of the throng. Anger came at the way individuals resisted his advance. Didn't they realize that he was a chief scientist? He saw mounted palace guardsmen urging their horses along the edge of the crowd a few score feet away, and he had his mouth open to call on them to assist him, when he saw something that stopped his words in his throat.

His attention had been on the

temple proper. In his endeavor to move, his gaze flicked over the surrounding park.

Five of Rosamind's young poets were hanging from a tree limb at the edge of the temple grounds farthest from the temple. From a stouter tree nearby, six juniors and three scientists were still kicking spasmodically.

As Alden stood paralyzed, a dreadful screaming came from four initiates whose necks were just being fitted with rope halters.

The screaming ended, as the wagon on which they were standing was pulled from under them.

The Lord Leader walked the streets of Linn. The downtown markets were crowded with traders from the hills and from across the lake, and there was the usual pack of wide-eyed primitives from the other planets. It was no effort at all to start a conversation.

He talked only to people who showed no sign of recognizing the unshaven man in the uniform of a private soldier as their ruler. It didn't take long to realize that the thousand persuasive men he had sent out to argue his side of the hangings were doing yeoman service. No less than three of them approached him during the course of the afternoon, and made skillful propagnada remarks. And the five farmers, three merchants and two laborers, to whom he talked, all answered his rough criticism of the Lord Leader with pro-government catchphrases they could only have heard from his own men.

It was gratifying, he told himself, that the first crisis he had forced was turning out so well.

The Linnan empire was only a generation out of the protracted civil war that had brought the Linn family to the leadership. His tax collectors were still finding the returns lean. And trade, though it was reviving swiftly in Linn itself, was making a much slower recovery in other cities, which were not favored by special exemptions.

Several wars of conquest were under way, three of them on Venus against the Venusian tribes. Ostensibly, these wars were being fought to punish the tribes for their raids against Earth. But the Lord Leader knew of at least two more important reasons. First, there was not enough money at home to pay the soldiers who, his generals reported, were still in a dangerously revolutionary mood. And second, he hoped to replenish the treasury with loot from conquered cities.

The Lord Leader paused mentally and physically before the open air shop of a dealer in ceramics. The man had the Linnan cast of feature and was obviously a citizen, or he wouldn't be in business. Only the opinions of citizens mattered. This one was in the throes of making a sale.

While he waited, the Lord Leader thought of the temples. It seemed clear that the scientists had never recovered the prestige they had lost during the civil war. With a few exceptions they had supported Raheinl until the very day that he was captured and killed. (He was

chopped into pieces by soldiers wielding meat axes.) The scientists promptly and collectively offered an oath of allegiance to the new regime, and he was not firmly enough entrenched in power to refuse.

He never forgot, however, that their virtual monopoly of atomic energy had nearly re-established the corrupt republic. And that, if they had succeeded, it was he who would have been executed.

The merchant's sale fell through. He walked over grumpily, but at that moment the Lord Leader noticed a passerby had paused, and was staring at him with half recognition.

The Lord Leader without a word to the merchant turned hastily, and hurried along the street into the gathering dusk.

The members of the Scientists Council were waiting for him when, satisfied that his position was inassailable, he returned finally to the palace.

It was not an easygoing gathering. Only six of the seven members of the council of scientists were present. The seventh, the poet and historian, Kourain, was ill, so Joquin reported, with fever. Actually, he had suffered an attack of acute caution on hearing of the hangings that morning, and had hastily set out on a tour of distant temples.

Of the six, at least three showed by their expressions that they did not expect to emerge alive from the palace. The remaining three were Mempis, recorder of wars, a bold, white-haired old man of nearly eighty; Teear, the logician, the wizard of numbers, who, it was said, had received some of his information about complicated numbers from the gods themselves; and, finally, there was Joquin, the persuader, who, for years, had acted as liaison between the temples and the government.

The Lord Leader surveyed his audience with a jaundiced eye. The years of success had given him a sardonic mien, that even sculptors could not eradicate from his statues without threatening the resemblance between the referent and the reality. He was about fifty years old at this time, and in remarkably good health. He began with a cold, considered and devastating attack on the Raheinl temple. He finished that phase of his speech with:

"Tomorrow, I go before the Patronate to justify my action against the temple. I am assuming that they will accept my explanation."

For the first time, then, he smiled, bleakly. No one knew better than he or his audience that the slavish Patronate dared not even blink in a political sense without his permission.

"I am assuming it," he went on, "because it is my intention simultaneously to present a spontaneous petition from the temples for a reorganization."

The hitherto silent spectators stirred. The three death-expecting members looked up with a vague hope on their faces. One of the

three, middle-aged Horo, said eagerly:

"Your excellency can count upon us for—"

He stopped because Mempis was glaring at him, his slate-blue eyes raging. He subsided, but gradually his courage returned. He had made his point. The Lord Leader must know that *he* was willing.

He experienced the tremendous inner easing of a man who had managed to save his own skin.

Joquin was saying suavely, "As Horo was about to state, we shall be happy to give your words a respectful hearing."

The Lord Leader smiled grimly. But now he had reached the crucial part of his speech, and he reverted to legalistic preciseness.

The government—he said—was prepared at last to split the temples into four separate groups as had been so long desired by the scientists. (This was the first they had heard of the plan, but no one said anything.) As the scientists had long urged, the Lord Leader went on, it was ridiculous that the four atom gods, Uranium, Plutonium, Radium and Ecks should be worshiped in the same temples. Accordingly, the scientists would divide themselves into four separate organizations splitting the available temples evenly among the four groups.

Each group would give itself to the worship of only one god and his attributes, though naturally they would continue to perform their practical functions of supplying transmitted god-power to all who sought to purchase it under the government regulations.

Each group would be headed, not by a council of equals as was the temple system at present, but by a leader for whom an appropriate title must be selected. The four separate temple leaders would be appointed for life by a joint committee of government and temple delegates.

There was more, but they were details. The council had its ultimatum. And Joquin at least cherished no illusions. Four temple groups, each ruled by a willful scientist, responsible to no one except perhaps the Lord Leader, would end forever any hopes the more enlightened scientists entertained.

He rose hastily, lest one of the fearful councilors should speak first. He said gravely:

"The council will be very happy to consider your offer, and feels itself privileged to have in the government a lord who devotes his obviously valuable time to thoughts about the welfare of the temples. Nothing could—"

He had not really expected to manage a postponement. And he didn't. He was cut off. The Lord Leader said with finality:

"Since I am personally making the announcement in the Patronate chamber tomorrow, the Scientists Council is cordially invited to remain in the palace to discuss details of reorganization. I have assumed this will require anywhere from a week to a month or even

longer, and I have had apartments assigned for your use."

He clapped his hands. Doors opened. Palace guards came in. The Lord Leader said:

"Show these honored gentlemen to their quarters."

Thus was the council imprisoned.

Scientist Alden, tottered through the crowd before the Raheinl temple on legs that seemed made of dough. He bumped into people, and staggered like a drunken man, but he was only dimly aware of his gyrations.

If he had been the only person in the group reacting, he would have been marked instantly, and dragged off to the gibbet. But the executions caught the throng by surprise. Each new spectator casually approaching to see what was going on suffered his own variation of tremendous shock. Women fainted. Several men vomited, and others stood with glazed eyes.

As he approached one trailing end of the crowd, Alden's brain began to trickle back into his head. He saw an open gate; and he had darted through it, and was floating—that was the new sensation in his legs—through the underbrush, when it struck him that he was inside the grounds of the Town palace of Lord and Lady Creg Linn.

That brought the most terrible moment of the morning. Trapped, and of his own doing. He collapsed in the shelter of an ornamental shrub, and lay in a half faint of fright. Slowly, he grew aware that there was a long, low outhouse ahead, and that trees would shelter him most of the way. He recognized that he could not safely hope to return the way he had come, nor dared he remain where he was. He rose shakily to his feet, and the gods were with him. He found himself shortly crouching in the long, narrow, hay storeroom adjoining the stables.

It was not a good hiding place. Its width was prohibitively confining, and only by making a tunnel in the hay near the door farthest from the stables did he manage to conceal himself.

He had barely settled down when one of the stable doors a dozen feet to his right opened. A four-pronged fork flashed in a leisurely fashion, and withdrew transporting a bundle of hay.

With a casual kick, the stable hand slammed the door shut, and there was the sound of retreating footsteps. Alden lay, scarcely breathing. He was just beginning to emerge from his funk a few minutes later, when, *bang!* another door opened, and another fork gathered its hay, and departed.

That was his morning, and yet, despite the repeated nervous shocks, by noon his mind had almost resumed normal functioning. He had his first theory as to why he had escaped the round-up that had caught the others. Only two weeks before he had moved to his new residence on the Avenue of Palms. The soldiers must have proceeded to his old address, and then had to cross the city to his new home, with

the result that he had left the house by the time they arrived.

Of such tenuous fabrics the patterns of his escape were woven. Alden shivered, and then, slowly, anger built up inside him, the deadly, gathering anger of a man wrongly persecuted. It was a fury that braced him for eventualities, and he was able at last to think with a clear-cut logic of what he must do.

Obviously, he could not remain within the grounds of the Town palace. Odd little memories came to his aid, things he had observed in earlier days without being aware that he did so. He recalled that every few nights hay ricks turned into the palace gates. Judging by the emptiness around him, a new supply must be almost due.

He must leave before the afternoon was out.

He began to struggle along the line of hay to the right. There was a gate on that side, and he remembered having once glimpsed the stables through it while taking a walk.

By sneaking out of the end door and around to the side of the stable, and then through *that* gate— If only he could find another set of clothes— Surely, there would be work clothes hanging up in the stables, preferably in view of the long hair that scientists affected, a woman's overdress—

He found what he wanted in the right end of the stable, which was devoted to milk cows. The animals and he were quite alone while he arrayed himself in the raiment that the milkmaids pulled over their pretty dresses when they did their chores.

The Town palace, after its brief flurry the year before as a Linn residence, had reverted swiftly to its role of agricultural, industrial and clerical center. There were guards within sight of the gate, but they did not bother to question a rather stocky woman slave, who went out with a decisive manner as if she had been sent on an errand by a superior.

It was late afternoon when Alden presented himself at the Covis temple. He was admitted immediately by the astonished junior to whom he revealed his identity.

On the fourth day, the baby was still alive. The main reason was that Tania could not make up her mind.

"I've had the turmoil of birth," she said savagely, "and no woman in her right senses nullifies that casually. Besides—"

She stopped there. The truth was that, in spite of innumerable disadvantages, she could imagine certain uses for a son whom the gods had molded in their peculiar fashion. And in this regard, the urgings of Joquin were not without their effect. Joquin spent most of the fourth morning on the subject.

"It is a mistake," he said, "to assume that all the children of the gods are idiots. That is an idle tale of the witless mob, which pursues these poor creatures along the street. They are not given an opportunity for education, and they

are constantly under pressures so great that it is little wonder few of them ever attain the dignity and sense of mature development."

His arguments took on a more personal flavor. "After all," he said softly, "he is a Linn. At worst, you can make of him a trustworthy aide, who will not have the same tendency to wander off to live his own life as will your normal children. By keeping him discreetly in the background, you might acquire that best of all possible slaves, a devoted son.

Joquin knew when to stop pushing. The moment he noticed from the thoughtful narrowing of the woman's eyes that his arguments were weighing with her, he decided to leave her to resolve the doubts that still remained. He withdrew smoothly, and attended the morning court of the Lord Leader—and there once more urged his suit.

The great man's eyes were watchful as Joquin talked. Gradually, his satiric countenance grew puzzled. The Lord Leader interrupted at last:

"Old man," he said curtly, "what is your purpose in thus defending the right to life of a freak?"

Joquin had several reasons, one of them almost purely personal, and another because he believed that the continued existence of the baby might, however slightly, be an advantage to the temples. The logic of that was simple. The baby's birth had precipitated a crisis. Its death would merely affirm that crisis. Conversely, if it remained alive, the reason for the ferocious reaction of the Linns would be negated to some small degree.

He had no intention of stating that particular reason, and he did not immediately mention his personal hope about the baby. He said instead:

"Never before has a child of the gods been deliberately put to death. It was always assumed the gods had their own obscure purpose in creating monsters in human form. Do we dare test at this time that such is or is not the situation?"

It was an argument that made the other man stare in astonishment. The wars the Lord Leader had fought had thrown him into contact with advanced thinkers and skeptics on several planets, and he had come to regard the gods as a means for keeping his rebellious subjects under control. He did not absolutely disbelieve in them, but he had never in his practical life taken their possible supernatural powers into account.

But he respected this scientist. He climbed to his feet, and walking down the steps, drew Joquin aside.

"Do you actually," he asked, "believe what you are saying?"

The question was an uncomfortable one. There was a time in Joquin's life when he had believed nothing. Slowly, however, certain things he had observed had brought a half conviction that the mighty invisible force given forth by the tiniest radioactive substance could

have no other explanation. He said carefully:

"In my travels as a young man, I saw primitive tribes that worshiped rain gods, river gods, tree gods and various animal gods. And I saw more advanced races, some of them here on Earth, whose deity was an invisible omnipotent being who lives somewhere in space in a place called heaven. All these things I observed, and in a similar fashion I listened to each group's particular account of the beginning of the Universe. One story has it that we all came from the mouth of a snake. I have seen no such snake. Another story is that a great flood deluged the planets, though how this could have been done with the available water, I do not know. A third story is that man was created from clay and woman from man."

He looked at his hearer. The Lord Leader nodded. "Continue."

"I have seen people who worshiped fire, and I have seen people who worshiped water. And then, as have so many others before me, I finally visited the valleys where our own gods are said to dwell. I discovered their residences on every planet, vast, desolate areas miles deep and miles long and wide. And in these areas, I saw from a safe distance behind lead embankments the incredible bright fires that still burn with unending fury in those fantastic deeps of Earth.

"'Truly,' I thought to myself, 'the gods, Uranium, Radium, Plutonium and Ecks are the most powerful gods in the Universe. Surely,' I decided, 'no one in his right senses would do anything to offend them.'"

The Lord Leader, who had also examined some of the homes of the gods in the course of his peregrinations, said, "Hm-m-m!"

He had no time then for further comment. From somewhere—it seemed terribly near—there was a sharp sound louder than the loudest thunder that had ever bellowed from the skies. It was followed half a minute later by a roar so loud, so furious, that the palace floor trembled.

There was a pregnant pause, not silent. From all directions came the sound of windows shattering with a thousand tinkling overtones. And then, that disturbance was overwhelmed by a third explosion, followed almost instantly by a fourth.

This last was so vast a sound that it was clear to everybody that the end of the world was imminent.

When Alden entered the great Covis temple on the afternoon of the third day after the birth of the Linn baby, he was a tired, hungry man. But he was also a hunted man with the special thoughts of the fugitive.

He sank into the chair that was offered by the junior. And, while the young man was still in process of realizing the situation, Alden ordered him to inform no one of his presence except Horo, chief scientist of the Covis temple.

"But Horo is not here," the junior protested. "He has but just

now departed for the palace of the Leader."

Alden began briskly to remove his female disguise. His weariness flowed from him. Not here, he was thinking gleefully. That meant *he* was the senior scientist in the temple until Horo returned. For a man who had had as many thoughts as he had during the afternoon, that was like a reprieve. He ordered that food be brought him. He took possession of Horo's office. And he asked questions.

For the first time, he learned the only reason so far made public, for the executions at the Raheinl temple. Alden pondered the reason throughout the early evening, and the more he thought the angrier he grew. His thinking at this time must already have been on a very radical plane, and yet, paradoxically, he felt mortified that the gods had been so profoundly insulted in their temples.

Somehow, with a crystalline certainty—that, yet, had in it no disbelief—he knew that they would not show their displeasure of their own volition. The thoughts of a fugitive tended automatically towards such practical convictions. Before the evening was half through, he was examining the possibilities.

Certain processes the gods had favored from time immemorial. Naval captains and other legal owners of spaceships brought ingots of iron to the temples. The ceremonial and money preliminaries being completed, the iron was then placed in close proximity to the uncovered

god stuff for one day exactly. After four days, one for each god, the power of the god-stuff was transmitted to the ingot. It was then removed by the offerer to his ship where, with simple ceremonials, it was placed in metal chambers—which any metal worker could make—and by the use of what was known as a pholectric cell—a device also known from the earliest times, like fire and sword and spear and bow—an orderly series of explosions could be started or stopped at will.

When enough of these metal chambers were used, the largest ships that could be constructed by man were lifted as easily as if they were made of nothingness.

From the beginning of things, the god-stuff in all temples had been kept in four separate rooms. And the oldest saying in history was that when the gods were brought too close together, they became very angry indeed.

Alden carefully weighed out a grain of each supply of god-stuff. Then he had four juniors carry a metal chamber from the testing cavern into the garden at the rear of the temple. At this point it struck him that other temples should participate in the protest. He had learned that six of the seven members of the Scientists Council were still at the palace, and he had a rather strong suspicion as to their predicament.

Writing from Horo's ornate office, he *ordered* the acting chiefs of the temples of the absent councilors to do exactly what he was doing. He described his plan in detail, and finished:

"High noon shall be the hour of protest."

Each letter he sent by junior messenger.

He had no doubts. By noon the following day he had inserted his grains of uranium, radium, plutonium and ecks into the pholectric relay system. From what he decided was a safe distance, he pressed the button that clicked over the relays in order. As the wonderful and potent ecks, the last grain, joined the "pile," there was an explosion of considerable proportions.

It was followed swiftly by three more explosions. Only two of the temples disregarded the commands of the fugitive. They were the fortunate ones. The first explosion blew half the Covis temple into dust, and left the remnant a tottering shambles of dislodged masonry and stone.

No human being was found alive in any of the four temples. Of Alden there was not even a piece of flesh or a drop of blood.

By two o'clock mobs were surging around the foot of the palace hill. The palace guard, loyal to a man, held them off grimly, but retreated finally inside the gates, and the household of the Leader prepared for a siege.

When the pandemonium was at its height half an hour later, Joquin, who had been down in the city, returned by a tunnel that ran through the hill itself, and asked permission to speak to the mob.

Long and searchingly, the Lord Leader looked at him. Then finally he nodded.

The mob rushed at the gates when they opened, but spearmen held them back. Joquin pressed his way out. His was a piercing rather than a deep voice, but the rostrum that jutted out from the hill was skillfully constructed to enable a speaker to address vast throngs through a series of megaphones.

His first act was to take the ribbons out of his hair, and let it down around his shoulders. The crowd began to shout:

"Scientist. It's a scientist."

Joquin raised his hand. And the silence he received was evidence to him at least that the riots were about to end. The crowd was controllable.

On his own part, he had no illusions as to the importance of this mob attacking the palace. He knew that carrier pigeon messages had been dispatched to the three legions camped outside the walls of the city. Soon, a disciplined force would be marching through the streets, paced by cavalry units made up of provincial troops, whose god was a giant mythical bird called Erplen.

It was important that the crowd be dispersed before those trained killers arrived on the scene. Joquin began:

"People of Linn, you have today witnessed a telling proof of the power of the gods."

Cries and groans echoed his words. Then again, silence. Joquin continued:

"But you have misread the meaning of the signs given us today."

Silence only this time greeted his words. He had his audience.

"If the gods," he said, "disapproved of the Lord Leader, they could just as easily have destroyed his palace as they actually did destroy four of their own temples.

"It is not the Lord Leader and his actions to which the gods objected. It is that certain temple scientists have lately tried to split up the temples into four separate groups, each group to worship one of the four gods only.

"That and that alone is the rea-

son for the protest which the gods have made today."

There were cries of, "But your temple was among those destroyed."

Joquin hesitated. He did not fancy being a martyr. He had seen two of the letters Alden had written—to the two temples which had not obeyed the instructions—and he had personally destroyed both letters. He was not sure how he ought to rationalize the fact that a purely mechanical union of god-stuff had produced the explosions. But one thing at least was certain. The gods had not objected to their status of being worshiped four in one temple. And since that status was the only one that made it possible for the scientists to remain strong, then what had happened *could be* the gods way of showing that it was their purpose, too.

Joquin recognized uneasily that his reasoning was a form of sophistry. But this was no time to lose faith. He bowed his head before the shouting, then looked up.

"Friends," he said soberly, "I confess I was among those who urged separate worship. It seemed to me that the gods would welcome an opportunity to be worshiped each in his own temple. I was mistaken."

He half-turned to face the palace, where far more important ears were listening than any in the crowd below. He said:

"I know that every person who, like myself, believed the separatist heresy is now as convinced as I am that neither the four gods or their people would ever stand for such blasphemy.

"And now, before there is any more trouble, go home, all of you."

He retreated rather hastily back into the palace grounds.

The Lord Leader was a man who accepted necessities. "There remains one undetermined question," he said later. "What is your real reason for keeping my daughter-in-law's baby alive?"

Joquin said simply, "I have long wanted to see what will happen if a child of the gods is given a normal education and upbringing."

That was all he said. It was enough. The Lord Leader sat with eyes closed, considering the possibilities. At last, slowly, he nodded his head.

I was to be allowed to live.

THE END.

Alexander The Bait

by WILLIAM TENN

A new author presents an ingenious new idea on how to get interplanetary travel started. It's done with a Moon-radar system. But not quite as the world thought—

Illustrated by Swenson

You aren't likely to get a quick punch in the snoot these days by professing admiration for Alexander Parks. Time has softened even the families of the crews who rode the GA fleet into nowhere; and uncomfortable understanding of the great thing the man did has increased with the years.

Still, he is penalized by a hidebound agency in a manner that, to him at any rate, is especially horrible. I refer to the FLC. I hope they read this.

We wandered into each other a couple of years after the war to end isolationism. I had just landed a Toledo accordion on a freight runway and was now headed for a bar. There are some pilots who know just how much rye they need after towing an accordion; me, I just keep pouring it down until my heart floats back into place.

A cab came up to the flight building and a well-built man with a surprisingly small head got out. As I ran up to nail the cab, the man turned and stared at me. Something familiar about that shoe-button skull made me stop.

"Were you in the Army Air Forces?" he asked.

"Yeah," I answered slowly. "The so-called Swasticker Squadron. Forty—Alex Parks! The voice with a dial!"

He grinned. "That's right, Dave. For a minute I thought you were only talking to ex-flying officers. Ground control people carry a lot of inferiority complex around with them. You're looking well."

He looked better. The clothes he was wearing had been designed by a tailor with the salary of a movie executive. I remembered something from the newspapers. "Didn't you sell some invention or other to some corporation or other?"

"It was the Radar Corporation of America. Just been capitalized. I sold them my multi-level negative beam radar."

"Get much?"

He pursed his lips and let his eyes twinkle. "Oh, a million five hundred thousand dollars."

I flapped my lips and let my eyes bug. "L-lotta dough. What're you going to do with it?"

"A couple of unholy scientific projects I've always dreamed about. I might be able to use you." He motioned to the cab. "Can we go somewhere and talk?"

"I'm on my way to a bar," I told him as the cab got under way. "Just came in with an accordion."

"Accordion? Is that what you freight pilots call these glider trains?"

"Yeah. And if you want to know why, just think of what happens when you hit an airpocket. Or a sudden head-wind. Or a motor stall." I grunted. "We make music—heavenly music."

We sat in a back booth of the *Matched Penny Cafe*, Alex smiling admiringly as I consumed half the amber output of a good-sized distillery. "You'd have to cut down on that guzzling if you came with me," he said.

I finished the glass, licked my teeth, my lips, and sighed. "Where?"

"A mesa in Nevada I've purchased. Have to have someone I can trust to fly equipment in and help around the place with some moderately heavy construction. Someone I can trust to keep his mouth shut. A heavy drinker keeps his open too much to suit me."

"I'll do that," I assured him. "I'd drink nothing but curded yak milk to get out of this aerial moving van business. Making an occasional trip will be nothing compared to my

daily routine with collapsible coffins. It's the combination of monotonous grind with the angel of death that's making me bottle-happy."

He nodded. "And the lack of any long-range useful goal. You flew on almost as rigid a schedule during the war, but—well, that was war. If there were something fine for which you were risking your life, instead of the transportation of electrical harmonicas—"

"Like interplanetary travel? That was one of your bugs. Going to do some experimenting along that line?"

Alex slid his forefinger along the green marble table top. "I'd need much more money than that. It's a nice thought—the human race finds itself at the point today where a little research, a little refinement of existing techniques, would send it to the stars. But the people who could do it, the big manufacturing corporations, can't see enough incentive; the people who would do it, the universities and research foundations, can't see enough money. We sit on this planet like a shipwrecked sailor on a desert island who sees a pair of oars in one spot and a boat in another and can't quite make up his mind to bring the two together.

"No, not interplanetary travel. Not yet. But something along that line. That beam I discovered gave me the reputation of the world's greatest radar expert. I intend to build the largest installation ever on that mesa—and make a long-distance radar survey."

This wasn't the Alexander Parks I'd known. This idea, I decided, showed nothing of what I'd always thought he'd do if he had the money to indulge his sardonically soaring mind, his genius for subtlety. "A radar survey?" I asked weakly.

His little head grew wide with laughter. "A map, my dear Dave—a topographical map of the Moon!"

Nevada was nice. Plenty of landing space. Plenty of working space. Practically no one to ask questions. Sharp, fragrant air on the top of Big Bluff Mesa that affected me almost as strongly as hooch used to. Alex claimed atmospheric conditions here were perfect for maximum equipment efficiency.

The equipment was odd. Of course, I knew radar had developed enormously since the days of primitive gadgetry in the early forties. Parks' own MLN Beam had successfully fused communication and noncommunication radio into a fantastic set-up that required no transmitter and made it possible to tune in on any outdoor event in the world. (It was still in production then.)

Alex and I got the shacks built ourselves, but we ran into trouble with the huge horizontal antenna and the gyroscopically stabilized dipoles. In the end he hired a man named Judson from Las Vegas. Judson did odd jobs around the place and supplied an extra pair of hands in construction jobs. Mrs.

Judson cooked our meals. Alex admitted the necessity for Judson, but seemed to regret it nonetheless. I suspected he sent me on sleeveless errands now and then, as if to keep me from having a coherent knowledge of his methods. I shrugged at that thought. If he thought I knew enough about modern radar, I was highly complimented.

When I flew in with a rattling glider train of impossible coils and surrealist tubes, he often insisted I stay put while he made some infinitesimal adjustment in the lab shack. I could climb out of the plane, then, but only if I went directly to the hut which was our living quarters.

Emmanuel Corliss, of the Radar Corporation of America, begged a ride from me once. All the way to Nevada he sang Alex's praises; he told me of the statue of Alex in the foyer of the corporation's skyscraper in Manhattan; he even had a copy of an unauthorized biography titled "Alexander Parks—Father of Global Communication." He said he wanted Alex to come back as chief research consultant. I thought atomhead would enjoy having his ego caressed.

I was wrong.

Fifty miles from Big Bluff, a deep voice rattled the reception panel. "Who's that you're talking to, Dave?"

Corliss piped up. "Thought I'd look in on you, boy. We might be able to use whatever you're working on now."

"Well, you can't. The moment you land, Dave, unhitch the gliders and fly Mr. Corliss back to the nearest airport. Got enough fuel?"

"Yep." I was embarrassed. Felt like a neighbor overhearing a newlywed couple's first quarrel.

"But, Parks," the executive wailed, "you don't know what an important figure you've become. The world wants to know what you're doing. Radar Corporation of America wants to know what you're doing."

Parks chuckled. "Not just yet. Don't get out of that plane, Corliss, or you'll get a load of buckshot in the most sensitive part of your upholstery. Remember, I can call you a trespasser."

Corliss sputtered angrily. "Now you listen to me—"

"No, you listen to me. *Don't get out of that plane* as you love your swivel chair. Believe it or not, old man, I'm doing you a favor."

That was sort of that. After I'd deposited the red-faced corporation president, I bumped down to the mesa pretty thoughtfully. Alex was waiting for me; he looked thoughtful, too.

"Don't do that again," he told me. "Nobody comes out here until I'm ready for, well, for publication. I don't want strangers, especially scientific strangers, poking around in my layout."

"Afraid they'd copy it?"

My question tickled him. "That's it . . . almost too exactly."

"Afraid I'll copy it?"

He threw a quick, shrewd glance at me. "Let's have supper and do

some talking, Dave." He put his arm around my shoulders.

While Mrs. Judson dealt out the plain food very plainly prepared, Alex studied me in the hard, unwinking fashion he had. I thought again that he resembled nothing more than a miniature camera set on a massive, unwieldy tripod. Grease-stained blue jeans had long ago replaced the soft sartorial perfections in which I'd first seen him. The father of global communication!

He looked covertly at Judson, saw that the hired man was interested in nothing but his stew, and said in a low voice: "If you feel I distrust you, Dave, I'm sorry. There is a good reason for all this secrecy, believe me."

"That's your business," I told him shortly. "You don't pay me for asking questions. But I honestly wouldn't know an oscillator screen from an indicator rack. And if I did, I wouldn't tell anyone."

He shifted on the hard wooden bench and leaned against the metal wall behind him. "You know what I'm trying to do. I send a high-frequency beam at the Moon. Some of it is absorbed in the ionosphere, most of it gets through and bounces off the Moon's surface. I catch the reflection, amplify it, record the strength and minutest change in direction on a photographic plate and send another, slightly different, beam out immediately. On the basis of multiple beams, I build up a fairly detailed and accurate picture of the Moon from very close range. My multilevel-negative radar provides a somewhat stronger beam than science has had at its disposal before, but essentially the principle is basic radar. It could have been done, with a little difficulty, ten years ago. Why wasn't it?"

Stew congealed into an unsavory jelly in my plate. I was interested in spite of myself.

"It wasn't done," he continued, "for the same reason we don't have interplanetary travel, suboceanic mining, grafting of complete limbs from corpses on amputation cases. Nobody can see any profit in it, any *immediate*, certain profit. Therefore, the small amount of research that is necessary to close the gap between the knowledge we already have and the knowledge we almost have goes unfinanced."

"But work goes on in those fields," I pointed out.

"Work goes on, all right. But at what a slow pace, under what heartbreaking conditions! Have you ever heard the legend of how my namesake, Alexander the Great, circled the world astride a giant bird? He hung a piece of meat from a long pole and dangled it in front of the bird's beak. A strong gust of wind blew the meat close enough for the creature to snatch, and the redoubtable Alexander immediately cut a piece of flesh from his side and attached it to the pole. Thus, he was able to complete his trip with the bird futilely trying to reach the meat by increasing its speed.

"The story occurs in several folklores with different heroes, but it

shows how fundamental was the ancients' understanding of human motives. Incidentally, it is also a beautiful illustration of the laws of compensation. In every age, a man must offer himself up as bait so that progress will not be limited to the back pages of the dictionary. We can't be said to be moving forward if we touch none of our newer potentialities."

I stirred the stew with a heavy spoon, then pushed it away and reached for the coffee. "I see what you mean. But why tell me all this?"

Alex rose, stretched and moved towards the door. I smiled apologetically at my coffee and Mrs. Judson and followed him.

The cool Nevada night hung heavily as we walked outside. A myriad stars blazed pinpoint mysteries. Was this black, inviting space man's natural medium, a domain waiting for the flashing tread of a master? Could it be that my puny species was the appointed ruler of these vastnesses? I wondered how it would feel to bank suddenly out there, to level out for a landing. My hands itched for an unmade, still nonexistent throttle.

"These are the maps I've made to date," my employer observed. We were standing in the lab shack with banked transformers, nightmares in spun glass and twisted wire weaving in and out of the huge display tubes around us.

I glanced carelessly at the maps; I was no astronomer. Then I glanced very carefully indeed at the maps.

The point is they weren't maps. They were pictures—over a thousand aerial photographs—taken from a uniform height of about five hundred feet. They had sharper detail than any aerial photographs I've ever seen. You could count the rocks on the surface; you could note pits and the narrowest fissures.

"They are pretty good," Alex said. He stroked one of the glossy sheets lovingly. "A section of the Tycho Brahé Crater."

"Why the Samuel Aloysius Hill don't you publish?"

"Couldn't till now." He seemed to be in the throes of a hard decision. "I had to check something first. And now I've got to trust you with my life's work by asking you to play a particularly dirty trick on yourself. I still can't afford to explain; my conversation tonight was sort of a song and dance to go with the request. But some day it will all fit."

"Go ahead. I'm a loyal employee; I love the firm."

The pinhead seemed to swell. "One week from today I want you to take a trip up to the Canadian North Woods with a couple of packages. You'll have a map with X's scattered over it; the co-ordinates of each X will be marked in the margin. Latitude and longitude in terms of degrees, minutes and seconds. Bury each package about two feet underground at X-designated spots, making certain that it is at the exact intersecting point of the co-ordinates. Then go away."

"Huh?"

"Go away and forget you ever saw those packages. Don't even dream about them. Don't see me except socially for at least three years. Forget you ever worked for me. You can keep the plane and I'll add a sizable check as a parting gift. Will you do it?"

I let my mind chew on it for a while. It didn't make sense, but I knew he'd told me all he intended to. "O.K., Alex, I'll take the high road and I'll take the dough road. I'll make out."

He seemed tremendously relieved. "You will make out—much better than you think. Just wait a few months. When the united savants of the world start flocking in here, there will be lectures and juicy magazine articles thrown at anyone who ever worked for me. Don't touch them with a transmitting antenna."

That made me laugh. "I wouldn't anyway. I don't play those games."

Alex shut off the light and we returned to the Judsons feeling pretty good about each other. That was the way a sweet guy called Alexander Parks climbed up on the altar of history. When I think of the fundamental ambition that drove him to that conversation, the action of the FLC seems cruel on a scale immeasurably picayune.

A week later I was flitting about the north woods laying little tarp covered eggs here and there by means of a chart so explicit as to be understandable by the littlest moron in one of his most difficult moments.

Newspapers caught my eye when I landed in Seattle. Full front-page spreads of the pictures Alex had showed me, smaller shots of Alex's small head surrounded by big-browed, white-maned profs from Oxford, Irkutsk and points east.

"Radar Genius Maps Moon," they screamed. "Sage of Nevada reveals work of two years. Scientists flock to mesa, claim telescopes now obsolete except as check. Alexander Parks announces he will make mineralogical survey of lunar surface."

So he had announced it. Good. I spent a portion of my last pay check investigating any new developments in the gentle art of making whiskey. The liquor, I found, hadn't changed; unfortunately, *I* had. Laboring under a diminished capacity, I gamboled from binge to hangover, from bar to hotel room, until I woke up in a hospital surrounded by a straitjacket.

After the doctor had chased the six-headed snakes away, I sat up and chirruped at the nurses. One luscious little redhead took to reading me the newspapers in a pathetic attempt at self-defense. I was getting the news in jerky flashes, what with her dodging around night tables and behind screens, when I heard something that made me reach out and grab the newspaper. The girl, who had been preparing for a last, all-out effort, looked a little dazed.

I still have a hazy memory of

that nurse standing in a corner and shaking her head while I got clearance. The doc didn't feel I was cured yet at all, but he decided that as long as I wasn't talking too loudly about ring-tailed octopi it would be just as well for his hypo house if I took up residence elsewhere.

Bascomb Rockets were the nearest and I was there a half hour after a starchy clerk had given me my clothes, money and a little white certificate, suitable for framing. I'd gone through every newspaper in reach by the time I arrived; so I was prepared for what I saw.

A two-by-three experimental house which had been operating on a frayed shoestring of a budget was expanding like a galaxy turned supernova. Far off into the distance, I could see shops and hangars going up, stock piles being built, equipment arriving by the cubic ton.

Tim Bascomb was checking blueprints in front of the half-finished Parthenon that was to be the company's main building. I'd met him at an ex-pilots' convention a year after the war, but I thought I might as well reintroduce myself—some insensitive people manage to forget me.

The moment he heard my voice, he dropped the blueprints and grabbed my hand. "Dave! You haven't signed any contracts yet?" he finished anxiously.

"Nary a clause," I told him. "Can you use a former B-29er and accordion player?"

"Can we use you? Mr. Hennessey—Mr. Hennessey, get me contractual form 16, no, better make that 18. You were in on the early jet and rocket jobs," he explained. "That puts you into an advanced category."

"Hiring a lot of the boys?"

"Are we? Every backyard gadgeteer in the country is forming a corporation these days and we're keeping up with the best of them. They say the airlines are using hostesses as co-pilots and candy butchers as radiomen. You'll find Steve Yancy and Lou Brock of the Canada-Mexico Line in that shack, over there; they'd like to see you."

Mr. Hennessey and a stenographer served as witnesses. I started scribbling my name on that contract as soon as I saw the numbers after the dollar sign under "salary." Bascomb laughed.

"I'll back our payroll against any in the world. Not that at least fifty other companies don't do as well. We've got the backing of Radioactive Metals and the Ginnette Mining Corporation as well as a government subsidy of five million."

I wiped some blue-black ink off my fingers. "Since when is the government interested?"

He chuckled. "Since when?" We began walking to a huge structure labeled "Bascomb Rockets Experimental Pilots—No Admittance to Unauthorized Personnel." "Look, Dave boy, when Parks took those radar snapshots of the Moon, the astronomers were interested. When he worked out a spectroscopic table and found there were healthy hunks of gold under the

surface, the banks and mines began to sit up. But when that Caltech prof turned Parks' gimmick along eighty miles of the Moon's Alpine valley and found alternate layers of radium and uranium, the nations of this planet looked up from atom bomb experiments long enough to harness everybody who knows the Moon is a quarter of a million miles from Earth. It's no longer a matter of the first extra-terrestrial explorer becoming a trillionaire overnight, but of folks cooking atom bombs in their kitchens."

I looked at the tractors backing and filling around me; at the cement-sloppy wheelbarrows being trundled by an army of construction workers; at the bare scaffolding of shops rising on every bare foot of ground. This scene was being duplicated everywhere in every state, probably in every nation. Slap some sort of a ship together, solve the problems with any kind of jerry-built apparatus—*but get to the Moon first!*

"It isn't only a matter of national defense, either," Tim was explaining. "We almost have atomic power, in fact, we already have it but not in a commercial form. With the uranium that can be dredged out of the Moon, the old Sunday Supplement dream of crossing the Atlantic with a teaspoonful of sand for fuel will come true. General Atomics is devoting half their budget to spaceship research. They may not be the first outfit to set a job down on Tycho, but they sure will bust a gut trying."

He led me into the pilots' shack where a lecture on astrogation was in progress. And that day the only rockets on the Bascomb lot were still on drawing boards!

"The Mad Scramble"—isn't that the name of the definitive history of the period? It was mad. People still remember the first casualties to hit the front pages: Gunnar and Thorgersen getting blown to bits a half-mile up; those six Russian scientists flaming into an incandescence that registered on every astronomical camera pointed at the Moon. Then that wave of reaction sweeping the world toward the end of the decade and laws clamping down on irresponsible corporations and wildcat experimenters.

Even then, Steve Yancy and his kid brother got knocked off on a simple experimental flight outside Earth's atmosphere. No fundamental principle overlooked, we were just building carelessly.

When Parks finally dropped in on us on his way from the Leroy Propulsion Project, we seemed to be getting nowhere fast. That was the Black April, the month of the GA Fleet. Bascomb had discovered I knew Parks personally and begged me to bring him into the firm. "He's just hopping about giving advice to anyone who wants it from him. With his reputation, if he ever went to work for one organization he could name his own price. Try to get him to name it for us."

"I'll try," I promised.

"Of course, I know his basic interest is in radar research. If his machine had stopped with mapping the Moon, every hick college would probably have had an appropriation for a radar telescope or whatever they call it. But since he found uranium in them thar craters, kids are being jerked into research projects as fast as they finish elementary physics. That guy from Caltech—what *was* his name?—who first detected radioactive stuff with Parks' equipment, they say he has to go up to the mesa every time he wants to survey some more moon. He can't get the university even vaguely interested in building a toy for him, and Alex P. won't let anyone near the layout unless he's on the scene holding their leash."

"Yeah." I grinned wryly, remembering the way Emmanuel Corliss had been sent back to his dictaphone. Even when some scientific journals had attacked the tight control he maintained over the world's only lunar-surveying radar, he had retorted angrily that the entire apparatus had been developed and built out of his own brain, time and funds and if anyone didn't like it they could build themselves another. Of course, with every research penny eventually finding its way into spaceship design, he had the only game in town.

Parks laughed when I gave him Bascomb's message. He clambered out of the new-smelling, black and silver job that I was to take on a shakedown in a week and sat on the curving metal runway.

"No, Dave, I like this being advisory expert to big business in rocket research. I get to travel and see all the different things we're trying. Did you know Garfinkel of Illinois is working on a Cosmoplane—sort of a sailboat sensitive to cosmic rays? I'd rather not get stuck in a job in one corner of this business. After all, anyone may hit it."

"But that isn't like you, Alex," I argued. "You were always the kind of guy who wanted to do things himself. This work isn't right up your alley, it *is* your alley. You're the one man Bascomb Rockets needs, not as a part-time unpaid specialist who hits us once a month on his look-see circuit, but as the director, the co-ordinator of our research. I'm just a stumblebum who can make with a joystick, but you are the guy who'll get us there."

"Ever mention our working together?"

"No." I sighed. He evidently didn't want in. I helped him change the subject. "Nasty—this GA business."

He was staring at the ground. He nodded slowly, then looked up. There were ridges of anguish on his face. "That was Corliss," he said in a low, earnest voice. "He became president of General Atomics six months ago. The idea of the Fleet probably seemed like a good publicity trick."

I disagreed with him. "After

all," I pointed out, "the logic was good. Ten ships setting off for the Moon together. When one of them hit a snag, the others could come up and help. In case of an impending blowup, the crews of the threatened ship could be transferred to safety. It was just plain unfortunate that Fouquelles didn't discover the deep space Jura rays until a week after they left. From now on everything we build will be insulated against the stuff."

"Five hundred men," Alex brooded. "Five hundred men and women lost without a trace. Nothing in the papers today about a radio signal, about some debris coming down somewhere?"

"No. They probably got out of control and drifted into the sun. Or maybe the ships—those that are left—are scudding aimlessly out of the system."

He was himself again when I left him at the gate. "Maybe I'll have cracked it the next time I see you," I said. "We're moving pretty slowly, though."

"That doesn't mean anything." He shook my hand warmly. "Man has his heart set on getting off this planet. He'll do it—perhaps sooner than he thinks."

Two months later, Captain Ulrich Gall landed the Canadian *Flutterer III* in Plato Crater, using the double-flow drive. It's high-school history now how Gall lined his spacesuited crew behind him and prepared to move through the air lock. How he caught his foot on the ramp, and how his polynesian "boy," Charles Wau-Neil, hurrying to extricate him, tripped on the lock and shot out onto the lunar surface—thus being the first human to touch another world.

I was co-pilot of the fifth ship to reach the Moon—"The Ambassador of Albuquerque." I was also the first man to set insulated foot on the lunar Apennines. So I'll have a place in some six-volume detailed history of lunar exploration: "An interesting discovery is credited to a minor adventurer named—"

Well, you know what happened. Toehold, the colony Gall left on the Moon, continued the feverish examination of mineralogical samples. No go. In six months Toehold scientists radioed a complete confirmation of Gall's early suspicions.

There was no uranium on the Moon. No radium. And there was just enough gold to be detectable in the most delicate analyses.

Of course they did find some nice beds of iron ore. And someone discovered rocks beneath the surface from which oxygen and the lighter elements could be extracted with ease, making possible Toehold's present indigenousness. But no uranium!

I was on Earth when the storm of public opinion broke. Financed and encouraged by hysterical corporations, it broke first around the head of a certain California professor of astronomy and buried him. He, it was, who had first announced the presence of radio-

active minerals on the Moon as a result of experiments with Parks' radar. Then it turned on Parks.

Remember the headlines that day? "Parks Admits Fraud" in letters as big as the end of the world. "Alexander Parks, Nevada charlatan, explained to the FBI today how he planted transmitters near pitchblende and gold deposits in Canada, co-ordinating his infernal machine with them to make it appear that the impulses were arriving from a given portion of the Moon. 'I never allowed anyone to investigate the machine too closely,' Parks leered, 'and this, with my international reputation as a radar expert, prevented discovery.'"

I scooted for his mesa. There were state police coming out of the woodwork, FBI men being trampled underfoot and what looked like a full infantry regiment marching back and forth. After I'd satisfied everybody that I was a reputable citizen, I was allowed to see Alex. He was evidently a *de facto* prisoner.

Alex was sitting at the plain table, his hands clasped easily in front of him. He turned and smiled with pleasure as I walked in. The man walking puffily up and down the small room turned too. With some difficulty I recognized the face above the purple neck as belonging to Emmanuel Corliss. He tore up to me and peering out of red-rimmed eyes began to grunt. After a while, I interpreted the grunts as "*You* ask him why. Ask him why he did it, why he ruined me!"

"I've told you that at least a dozen times," Parks said mildly. "There was nothing against you personally, nothing against anybody. I simply felt it was time we had interplanetary travel and that greed was a good incentive. I was right."

"Right!" Corliss screeched. "Right! Do you call it right to flimflam me out of three million dollars? I personally invested three million dollars to get what? Iron ore? If I want iron ore, isn't what we have on this planet good enough?"

"Your consolation, Mr. Corliss, in your financial bereavement, is that you have helped humanity to take a major historical step. You will recall that I went as far as using a shotgun in an attempt to keep you from getting involved in my . . . my plans. Beyond suggesting that you record it in your income tax under bad investments, I'm afraid I can't help you."

"Well, I can help you!" The president of General Atomics and the Radar Corporation of America shook a pudgy, quivering finger under Parks' nose. "I can help you into jail. I'll spend the rest of my life trying!" He slammed the door behind him so hard that the shack seemed to move three feet.

"Can he do anything, Alex?" I asked.

He shrugged. The pinhead looked tired. I suspected there

had been a lot of this lately. "Not so far as I know. All the development on my lunar radar was out of my own funds. While I gave advice freely to those who wanted it, I never accepted a penny from any corporation or individual. I benefited in no material way from the fraud. My lawyers tell me it may be a tight squeeze, but there isn't anything that can be done in the way of punishment. I'm in the clear. Are . . . are you angry at me?"

"No!" I put my hand on his shoulder. "You've made life worth living for hundreds of us. Listen, Alex," I said softly, "I don't know what history will say, but there are a lot of sky-jockeys who will never forget you."

He grinned up. "Thanks pal. I did try to keep you out of the mess. Name a precipice after me."

We can't go any further than the Moon right now, but I have a dandy little two-man ferrying job —secondhand of course—and as soon as I can scrounge up enough cash, I'm going to fit it with that new triple-flow drive. They say Venus should be in an early geological stage, and that means a lot of whole radium and uranium will be lying about. The first man to get there and stake out a claim would be kinda well-to-do the rest of his life. Yeah, that talk may be just some more sucker bait, but, just think, if it *is* so—

Whatever its original impulses, interplanetary transportation is here to stay. But what of the man responsible?

The Federal Lunar Commission (FLC) has issued a permanent injunction to all its offices against granting Alexander Parks terrestrial clearance. And unless he stows away on some supply ship, or time heals that particular wound, I'm afraid he'll be a wistful Earthlubber to his dying day.

THE END.

THE ANALYTICAL LABORATORY

The Lab is definitely thin this month. The February Astounding, because of a concatenation of circumstances, contained only three pieces of fiction, and with the vote-points ranging only from 1 through 3, all the point scores were bound to be close together.

At any rate, the scores came out this way:

Place	Story	Author	Points
1.	Special Knowledge	A. Bertram Chandler	1.72
2.	Fairy Chessmen (II)	Lewis Padgett	1.83
3.	This Is The House	Lawrence O'Donnell	2.72

THE EDITOR.

Brass Tacks

Angelenos Please Note!

Dear Mr. Campbell:

You and your readers will no doubt be interested to learn that A. E. Van Vogt, the author who has risen to scientifictional heights under your aegis, has been selected as honor guest for the 4th WORLD SCIENCE-FICTION CONVENTION. This is the second time that one of the authors developed by Astounding has been picked for speaker, Robert Heinlein having had this distinction at the last Convention, held prewar at Denver.

The 4th World Science-Fiction Convention, first full-scale meeting of science-fictioneers since 1941, will be held in Los Angeles on July 4-5-6-7.

The Convention will be popularly referred to as "The Pacificon."

Memberships—one dollar—in the Pacificon Society are immediately acceptable by Chairman Walter J. Daugherty, 1305 W. Ingraham, Los Angeles 15, California. Join now to receive all literature pertaining to the event. Plan to attend! —Forrest J. Ackerman, Pacificon Publicist.

Dear Mr. Campbell:

Attendees at the Pacificon—4th WORLD SCIENCE-FICTION CONVENTION—in addition to hearing A. F. Van Vogt speak will have the opportunity to meet and talk with such popular writers as Padgett, Rocklynne, Hubbard, C. I. Moore, E. Mayne Hull, Cartmill and Laurence O'Donnell.

July 4-5-6-7 is the date; Los Angeles, the city. Memberships—one dollar—in the Pacificon Society should be sent to Walter J. Daugherty, 1305 W. Ingraham, Los Angeles 15, Cal.

Readers in the metropolitan area are especially urged to contact the Convention Committee—Forrest J. Ackerman, Pacificon Publicist.

Well, Man's the laziest critter on Earth, and if he can get a little atom to do big work, he'll have more time to set and think how to get out of doing what work is left to do.

Dear Mr. Campbell:

Grandpa Sneejum, being a little low on book-learnin', likes to have me read to him from Astounding. He particularly enjoys hearing the technical tales of George O. Smith —like "Trouble Times Two" in the December issue. The words, he says, sound so mysterious and awesome.

Grandpa Sneejum, though a fan from way back, is equally awed by the atomic saga and the snappy little excerpts from Dr. Smyth's report. He opines that the whole project was right smart, and that atomics might eventually effect the biggest change in civilization since the disappearance of the celluloid collar.

He has just one question, though. And that after hearing my summary of the editorial and Brass Tack comment, with its general enthusiasm over the tremendous progress forward of humanity via atomic energy—and its specific zest over things like Astounding's on the Moon by 1955.

The query is kinda flabbergasting.

Grandpa wants to know *why* an atomic civilization would mean progress for mankind.—Bill Stoy, 140-92 Buvden Crescent, Jamaica 2, New York.

Dear John:

For the other John Campbell's benefit, ASF, XXXVI, ii, 147, "Sprague" rhymes with "plague" and "de Camp" is pronounced the same as "decamp." "Willy Ley" is "willy lay," not "veely lie." His surname was pronounced "lie" in German, but he switched to "lay" in this country because of the unfortunate homophony of the original. And "willy" is close enough to Willy's German, wherein "w" spells a bilabial voiced fricative, like the intervocal "b" in Spanish, between English "w" and "v." Asimov is AZ-im-off; Heinlein HINE-line; del Rey del-RAY, and his real given name is Ramón followed by about a dozen more Spanish names. I could do this much better if S & S would invest in a set of International Phonetic type.—L. Sprague de Camp.

The Gentleman has a point!

Dear Mr. Campbell:

I have just finished "The Fairy Chessmen." The theme and plot were superior and the language was outstandingly pleasing. "Chessmen" compares very well with the best fiction being written anywhere today. Mr. Padgett has mastered fine English as well as technology.

Billy Van Ness' extratemporal perception brought to mind a flaw in the theory of time travel. Time travel is an old and proven medium for expressing all sorts of complex

situations. It is readable; it is respectable. In 1944 Astounding published a fine story called "As Never Was." It is a detailed and logical textbook of time-travel theory, and goes to show how much earnest thought has been given it.

The flaw seems to be this: in perceiving the duration of things Billy Van Ness experienced their temporal motion, but not the accompanying spatial motion. In a laboratory, Billy walked around equipment that would be there in the near future; he felt the long duration of the Duds and of Ridgeley. This assumes that time has for its inflexible center lines some fixed spot: in this instance, wherever Billy's sensitive mind happened to be. Actually, Billy would have seen these things trailing away behind and before the Earth's point in its orbit as it swung out of the temporal positions of the past toward those of the future, and also out of the points it had previously occupied in space toward new points.

Billy's world would move in time, and through space along the Earth's orbit corrected for rotation, perturbation and various sways and wobbles. Complex as this would be, these are the only factors if the center of our system were also the center of our time, but this is not so. Sol has a definite but duly charted track around the nucleus of the Galaxy. And what monstrous swoops the nucleus makes have not been imagined. Billy would perceive the worlds of the past and future along a complex and immense track. The time machine and its variations selects some point in Billy's world and moves to it through measurable, reliable time; but Billy's world is also one of enormous motion in space. The time machine must compensate for this or it will dump its operators into emptiness, or perhaps jam them into a star that had moved into that position since now. The chances of a safe hit on the Earth of another time are almost nil.

The most direct solution would be to find the "center" of time and then determine the exact motions of all things about it. Somewhere the Earth would again occupy the same space as it does now; it would be an easy move through time alone to this point.

In a universe of enormous motion, as ours seems to be, there is little chance of success with this method. The next best answer is to load the time machine on a spaceship, seek some point remote from spatial motion, then move the ship in time and take your chances. The Earth might then be sought by movement in space alone. Tedius, but fun.—Don Scott, Aplena, Mich.

Hm-m-m—but there is an acute psychological difference between contemplation of the concept of death and contemplation of your own immediate and violent destruction! Many a man who views death philosophically in

the abstract becomes frantic when he sees his own death approach.

Dear John:

No doubt Brass Tacks will have plenty to say about "The Fairy Chessmen." Unlike "World of A," it will probably not be extolled by many as a landmark of science-fiction. At least, such is my guess. But I think some readers will assert that in the story Padgett has introduced a new concept; to wit, his variable-truths equation.

Well, I'd like to anticipate this reader-reaction, should it occur, and put myself on record as differing from it. Unless I misread passages of considerable length in the story—Padgett has *not* introduced a new concept. And to solve an "equation" which denied the "fundamental truths" of science would not require mathematicians who wrote fairy tales, or mathematicians who played fairy chess, but just mathematicians.

Now first of all, it's obvious from the story itself that Padgett is not one of the math men himself. (Witness the peculiar insistence on the importance of the "speed" of a falling body; the most non-mathematical engineer knows that it's the acceleration and not the speed which is roughly constant in the Earth's gravitational speed.) It's also obvious from the many excellent stories Padgett has contributed in the past that knowledge of math is anything but essential to the writing of first-rate science-fiction. However, it is painfully obvious that Padgett should have acquainted himself, not with the details, but with the principles, of mathematics, before writing "The Fairy Chessmen." Had he done so, he would either have realized that he just didn't have a new concept, or he would have stated the hypothetical new concept in a manner less liable to misinterpretation. If you'll hold on a minute I'll try to explain what I mean by these harsh-sounding statements of mine.

Roughly, the main problem throughout most of the story is the impossibility of finding anyone with a scientific background who has a sufficiently elastic imagination to accept, and work with, anything which denies familiar concepts. I quote from the first installment (p 44): "The average scientifically trained mind is inelastic by definition; it's fan-shaped. It's imaginative at the wide part of the fan, but it's rigidly censored by the narrow part—the accepted basics." Very well-expressed, and very true, of the *average* scientifically trained mind, in fact of most scientists and applied mathematicians. *But* one of the most important features of pure mathematics is its insistent refusal to accept any basics at all.

Here's the way mathematicians attacked the ugly fallacy that two plus two equals four. They looked at the old familiar integers that had been man's counting tools since prehistoric times, and demanded, "What are the essentials in this thing? How can we state

simply the arbitrary properties which have been assigned to these symbols '1, 2, 3—'? What *are* the properties of numbers which make them behave as they do and which have made them so useful?" After sufficient thought had been expended on these questions, the point was reached where one could catch hold of the basics pretty well. One could say, "I'm going to write down a symbol for zero, a symbol for integer—any integer at all—and a symbol for add. I'm not going to say what they mean. Next I'm going to assume certain properties and require my symbols always to have these properties. Now I'm ready to define a new symbol, '1,'; then '2', then '3', then '4'. Having done this I am prepared to prove that if my basic symbols have the assigned properties and if my defined symbols accord with my definition, then—two plus two equals four." (In case anyone's interested, the above-sketched procedure is almost exactly what Giuseppe Peano does in his *Arithmétique*.)

The next step in the mathematician's procedure is the crucial one and the one which I think makes my point against Padgett. The math men are not content to sit back and say, "Look, I have shown the essential features of our system of integers." Instead they get a little impatient and say, "If the properties we have assigned our symbols lead to the familiar integers and to the theorem '2 plus 2 makes 4', what would happen if we assigned *different* properties?" That question represents the natural next step in the mathematical thought-process. If one set of assumptions—i. e., basics—leads to interesting and familiar results, perhaps a modified set of assumptions will yield results equally interesting and less familiar; let's try it. And the mathematician does.

I don't care whether he writes fairy stories, I don't care whether he plays fairy chess; he's strictly in the habit of assuming *nothing* basic.

Perhaps I should append to the above these two disclaimers. I am not trying to represent the mathematician as superior to other scientists, but merely to point out the difference in approach; so all you physicists and engineers can lay down your hatchets and preserve my scalp for another day. And Mr. Padgett, please lay down your tomahawk also. I am decidedly not trying to run your story down. I enjoyed it very much in spite of my mild rebellion at the feature mentioned above.

To me, the best thing about "The Fairy Chessmen," outside of its great value purely as a story, was the point made in the closing pages of the second installment. Continual preparedness for, and anticipation of, war, may at times seem necessary, but is likely to lead to an acceptance of war by the people as a natural and inevitable thing, which in turn creates a state of mind highly conducive to further war's actually breaking out. And the end-product, Ridgeley, is

something the man of today doesn't like to contemplate. Nevertheless, the possibility of Ridgeley, like the possibility of an atomic war, is something we must force ourselves to contemplate no matter how unpleasant the process may be; all praise to Mr. Padgett for working it into his story.

Now for a few comments on the two issues in which Padgett's serial ran. January 1946:

1. "The Fairy Chessmen."
2. "The Plants."
3. "N Day."
4. "Veiled Island."
5. "A Matter of Length."
6. "Fine Feathers."

In this issue, I was much amused by the "pterodactyl" depicted by the artist as a Chinese dragon with a segmented body and bird's wings, apparently breathing fire: (P 71.) In re "Fine Feathers," I remark only that Smith is as unfit to write of Van Vogt's Galactic Ones as Van Vogt is to write of betatrons.

February 1946:

1. "The Fairy Chessmen."
2. "This Is the House."
3. "Special Knowledge."

"This Is the House" is pleasantly reminiscent of Padgett's beautiful little shorts of many months back —"Shock," "Ghost," and the rest. Same writing style, same slow build-up, same agonizing feeling of unrelieved suspense at the end. "Special Knowledge" suffered from infiltrations of corn which the author could certainly have avoided.

Hm-m-m, let's see. What *would* the weather tend to be like on Venus if, as Chandler guesses, it rotates much more slowly than Earth? Coriolis force would be less, correct. The other main factors influencing cyclones and anti-cyclones are independent of speed of rotation of the planet centrifugal force tending to drive air away from a high or a low, and pressure gradient pushing air from high to low. But centrifugal force depends on speed of rotation of the air mass, which in turn depends on Coriolis force—quick, Williamson! What's the answer? My first guess is that a lower angular velocity of air mass would cause cyclones to cover almost as large an area as anti-cyclones, instead of the latter's being much more spread out, as on Earth. 'Tis only a guess.

In ending this already overlong letter, I want to compliment Astounding's editorial policy on the atomic bomb. Not that I agree with everything that's been said; but if anything's needed now it is something to jolt people into a realization of the terrible danger that confronts them so immediately. Astounding is supplying plenty of jolts, with its honest and explicit comments on humanity's present prospects.—Ens Chandler Davis, USN Mine Countermeasures Station, Panama City, Florida.

* * *

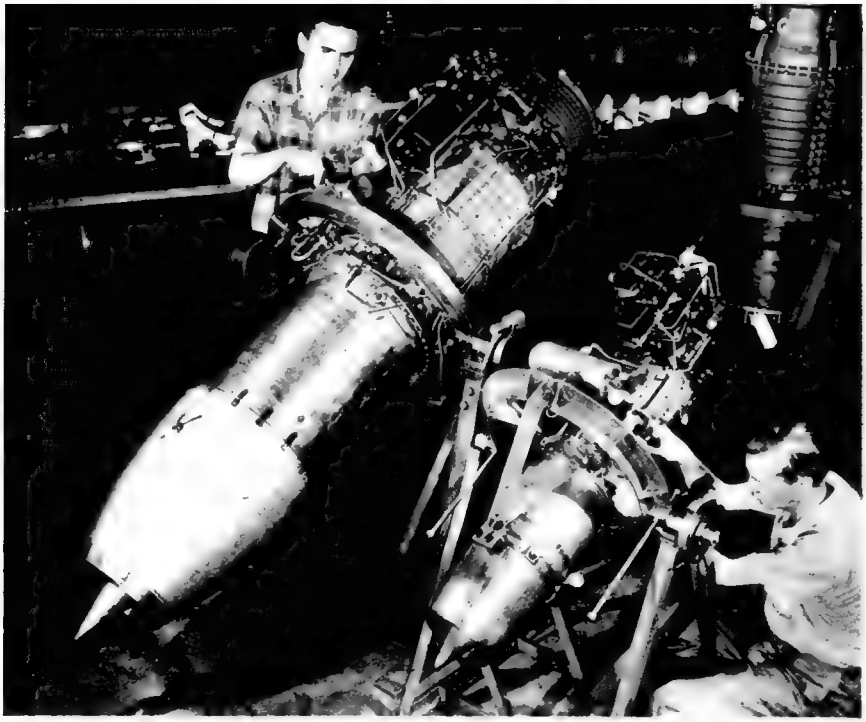
Spiderweb

Industrial machinery is usually dull in color, a jumble of strangely shaped masses, of interest only to the technician. But sometimes a photographer with imagination can find in it strikingly effective pictures. Westinghouse Electric Company doesn't ordinarily name their photographer—but the gentleman is good. The shot of a workman soldering armature winding leads onto the collector rings of a big rotary converter is a dramatically lighted pattern shot. The insulator bushings of the giant 230,000 volt automatic powerline switch above is equally well-conceived—and far removed from the all-too-familiar full-face, flat-lighted catalogue shot that makes a 100,000 kilowatt power installation look like a child's model.

Westinghouse has a crystal-gazer, too—only this crystal predicts some highly interesting decorative lighting effects. The globe represents the simplest light-source imaginable—it consists of practically nothing in a glass bubble. The light comes from highly ionized gas, under very low pressure; the energy, however, comes from the high-frequency electric field produced by the darkly shadowed metal disks at the upper right. The light can be made the orange-red of neon, through the entire spectrum to the blue-violet of argon by choice of the gas used in the globe. A wider choice of colors is possible in this system than in the familiar neon tubes; oxygen cannot be used in standard tubes because it is so corrosive when electrically activated.

Above is the exhaust orifice of one of Westinghouse's jet motors, designed for the Navy. Both General Electric and Westinghouse have worked up jet motors, but the two types differ much as the gasoline engine and Diesel engine—both internal combustion piston engines—differ in the way they apply the same general principle. Westinghouse uses an "axial flow" type compressor, followed by the combustion chamber and the turbine which powers the compressor. The original Whittle British engine, like GE's jet, uses a centrifugal compressor, in which the air enters at the center, is accelerated outward by paddlelike blades, and leaves the compressor at right angles to its direction of motion on entry. To enter the next stage of the compressor, it must be redirected toward the center, and is then compressed outward again.

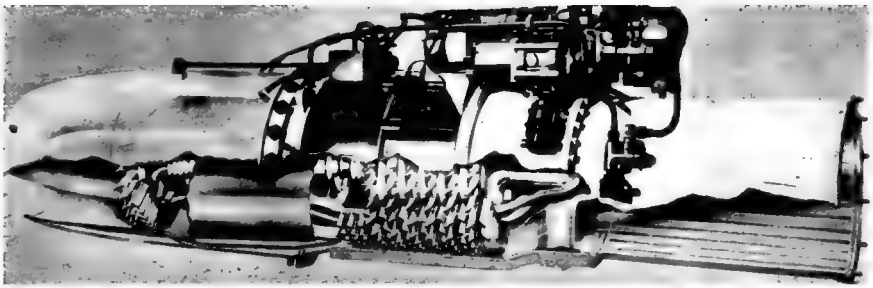
The "axial flow compressor" is simply a turbine working in reverse; the air enters at the front, travels in a straight line through the compressor, and leaves at the rear. In the drawing on the top of page 104 is an artist's cutaway view; at the right, the air enters the intake throat, passes to the compressor at the center; goes through the combustion chamber just to the left, then on to drive the turbine at the left, and out the jet throat at the far left. The compressor is a multiple-stage turbine in effect, with



alternate rows of stationary and moving blades, very carefully and accurately shaped. When the plane using such a motor is stationary on the field, air enters the intake throat at about 300 miles an hour. The compressor blades are small—the overall diameter of this, the "large" size engine, is only 19 inches—but turn at terrific speed—18,000 R.P.M. After mixing with the fuel and burning in the combustion chamber, the gases, now much expanded by the heating, must leave at the rear through an orifice of the same approximate size as that through which they entered. Since the volume has increased, the speed at exit must be higher. The net acceleration between speed-at-input and speed-at-outflow has been caused by the force of the compressor; the force has its equal and opposite resultant on the compressor which drives the jet-motor forward.

Rating the power of a jet motor is difficult because its output is pure thrust: when the jet engine stands still, it does no work and technically its horsepower is zero. On the other hand, at 600 MPH the 19-inch jet motor delivers a thrust of 1,400 pounds—and that's horsepower!

The compressor is driven by the power developed by the small turbine; that turbine may be small, but in this 19-inch model, it develops 3,400 horsepower!

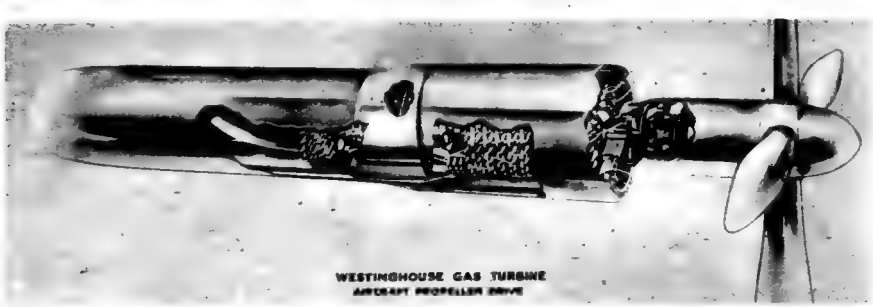


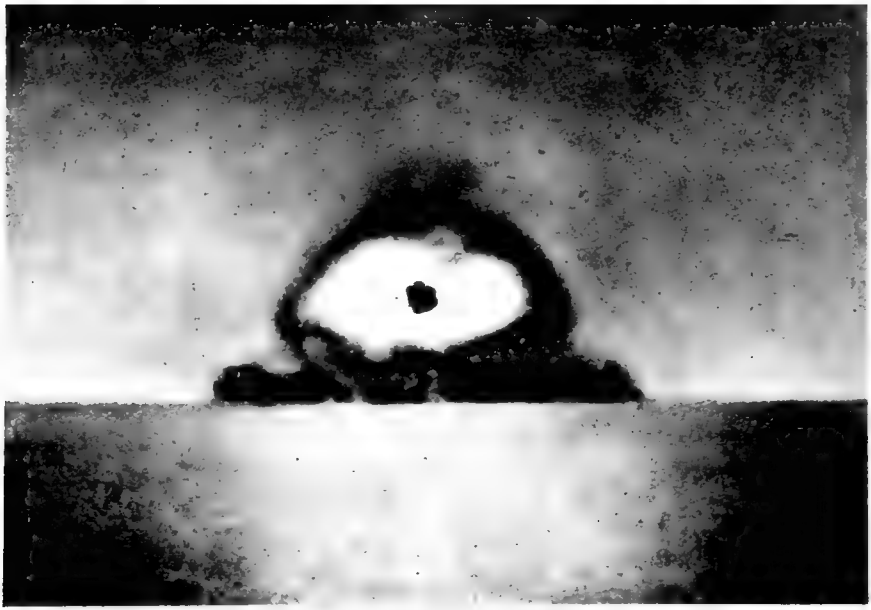
On the bottom of page 104 is a picture of a modified jet engine, the gas-turbine engine. Essentially, it is a jet engine in which the turbine has been increased in size, so that the exhaust jet can be almost completely robbed of its power, and the jet-thrust, therefore, is greatly reduced while the power available at the compressor-turbine shaft greatly increased. This power can then be taken off by gearing to drive a standard propeller.

The trouble with the jet engine is that trick of "no-speed; no power." The lower the speed at which the jet moves, the less efficient it is. Below about 400 miles per hour, the propeller is more efficient; above 400, the jet excels. For large transport and freight planes, the gas turbine is better than the true jet; the jet will be used only for very fast ships such as military craft.

The two engines shown on page 103 are the Westinghouse 19-B and the 9½-A jet motors. The figures refer to the diameter of the engines, the B signifying it's a second model type. The 19-inch motor is intended for fighter planes; the 9½ inch job is for self-propelled radio controlled weapons—an American kamikaze, with electronic brains. The little fellow weighs only 145 pounds, and delivers a thrust of 250 pounds—275 horsepower at 375 miles an hour. The rotating unit—the turbine, compressor and shaft are a single unit—in the little one turns over 566 revolutions per SECOND!

THE END.





Press Association, Inc.

The presence of neutrons can sometimes be detected by the naked eye (or, rather, the eye protected by almost opaque goggles).

Phony Atoms

by J. J. COUPLING

We've known about atoms with protons and electrons for a long time; there have been suggestions of atoms with inverted structure—contraterrene atoms. But now it appears there are imitation atoms as well! But the phonies are soon unmasked—the masquerade lasts a few billionths of a second only!

Do you want to be right in on the ground floor of a new scientific discovery? Granted, there's some risk. You may be ahead of the world—or you may be just another sucker, playing the races with the aid of an untrustworthy dope sheet and not knowing until

too late that your confidence has been misplaced. Why not take a chance? There's nothing to lose but your reputation, and if the theory really crosses the line of experiment, think how smart your friends will credit you with being!

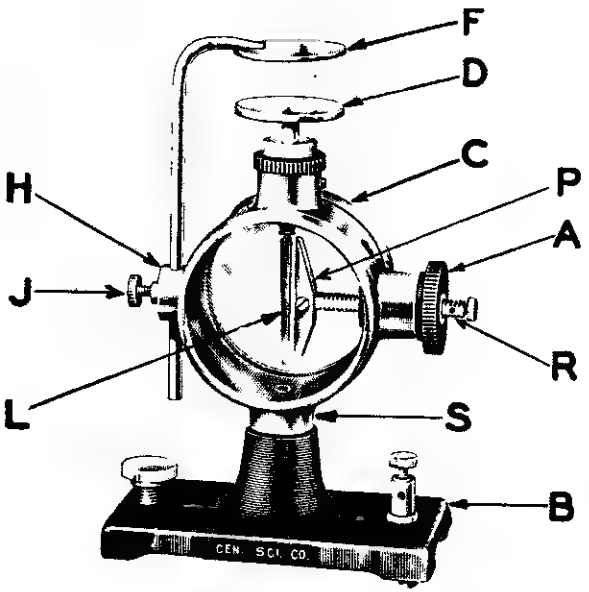
When, many years ago, I read Victor McClure's "The Ark of the Covenant," I remember balking at one point. The *Ark*—a super-duper dirigible—was filled with a gas, aithon, I believe, which was lighter than hydrogen. I knew that this just couldn't be so. A hydrogen atom is composed of one negative electron—mass negligible—and a central positive nucleus or proton, itself an elementary particle, having a mass about eighteen hundred times as great as that of the electron. How could there be a lighter atom? If we eliminated the solitary electron, the mass would not be appreciably decreased, and as for the proton, why, that was the very heart and soul of the hydrogen atom. All atoms have heavy particles in their nuclei, and the least nucleus we can have is a single proton!

As the advertisements say, what is wrong with this picture? Perhaps nothing. In seeking further light, we may as well travel by the tortuous detour actually followed in scientific thought to arrive at a startling—true or false?—new hypothesis.

It used to be that there were few enough elementary particles. We had the elementary positive particle, the proton, or hydrogen nucleus, and the elementary negative particle, the electron. These two have equal charges but very unequal masses. Together, they were to have been the building blocks of the universe, indivisible elements of which all matter was to be constituted.

This was too good to last. The situation became so bad that a cynical scientific friend of mine suggested the universe must be getting out of control, and odd new accidental particles appearing in defiance of earlier scientific law. He went on to say that eventually phenomena would become complicated beyond all rational explanation, the cosmos degenerating into a disorder like that of a wound clockworks with the bolts loosened; that new sorts of fragments would burden a once rational structure in increasing and finally overwhelming abundance.

We hope that the situation is not as bad as this, and that the discovery of new particles is simply a result of greater astuteness on the part of physicists. Such astuteness has consisted partly in the development of new and better apparatus and techniques, and partly in an increasing care and rigor in interpretation of records and data and in their correlation with accepted theory. Without such correlation, a foggy trace in the saturated vapor of a Wilson cloud chamber would be but a foggy trace; with such correlation it becomes evidence of the transit of a proton, electron, positron, or mesotron.

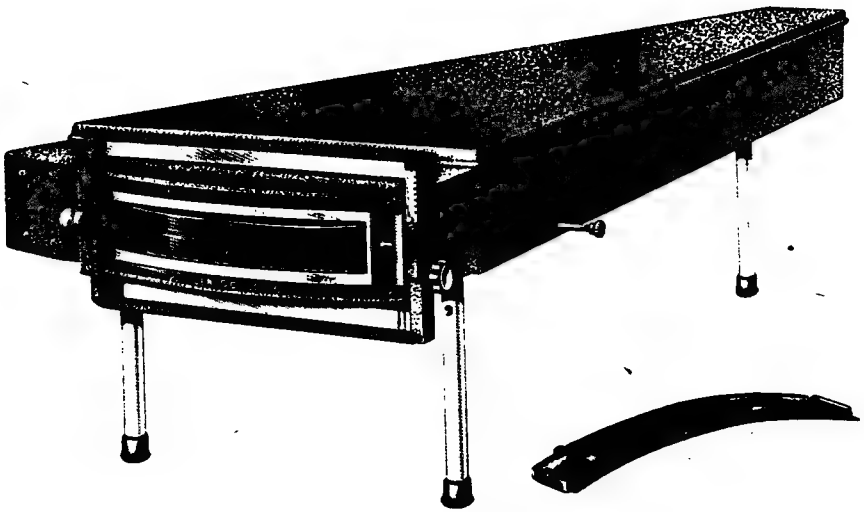


Courtesy of the Central Scientific Company

The electroscope is one of the earliest devices used for detecting particles. Like electric charges on L and P repel one another and cause L to stand away from P. Fast charged particles of ionizing radiation cause the charge to leak off, and L slowly falls down. The rate of fall is a measure of the intensity of the ionizing particles or radiation. Tiny electroscopes with clockwork driven film are sent aloft by small balloons in cosmic ray studies.

Whatever the cause, new particles did make their appearance. The first was the neutron, first observed in Germany in 1930 by W. Bothe and H. Becker as a very penetrating radiation produced when the radiation of polonium fell on beryllium, boron, or lithium. Work in 1932 by Irene Curie and F. Joliot in Paris and finally, again in 1932, by Chadwick in England identified this radiation as neutral particles nearly equal in mass to the proton. The neutron is now a respectable component of atomic nuclei, as well as what may be called the activating force of the—have you by chance heard of it? —atom bomb.

Other particles followed shortly. C. D. Anderson discovered the positron in 1932, and received the Nobel prize for doing so. As the positron is very important to us, we may pause a moment to say that it is a particle of electronic mass having a positive charge equal and opposite to that of the electron. It is very unstable, tending to



Courtesy of the Central Scientific Company

Light acts in many instances like a stream of particles. The particles are called photons. Unlike material particles, photons travel always with the same speed, 186,000 miles a second. The spectroscope spreads various colors of light into a rainbow along a long narrow aperture, and the intensities of different colors can be recorded on a narrow photographic film. According to the wave theory, the color is a measure of the frequency or rate of vibration of the light; it may also be regarded as a measure of the energy of the photons composing the light. Photons of high frequency blue light have more energy than photons of low frequency red light. Besides light, infrared, ultraviolet, X ray and gamma rays are of a photon nature.

combine with a negative electron, leaving nothing but gamma radiation —a purely electromagnetic disturbance. In fact, according to Dirac, the English now-physicist, once-electrical engineer, whose theoretical predictions anticipated the discovery of this particle, the positron is merely an unoccupied negative energy level—a place where, by all probabilities, an electron should be traveling with an imaginary momentum, but isn't. This will be perfectly comprehensible to those who have read the C T—contraterrene matter—stories in Astounding. In any event, the positron is now as respectable as the neutron, and no physicist of these days would think of doubting it.

Following the positron came the neutrino, a particle of no charge and of very low, perhaps electronic, mass. The neutrino is not directly—meaning, not with the usual minimum of indirectness—observable, but is very handy and

indeed essential as a means for conserving energy and momentum in certain nuclear reactions.

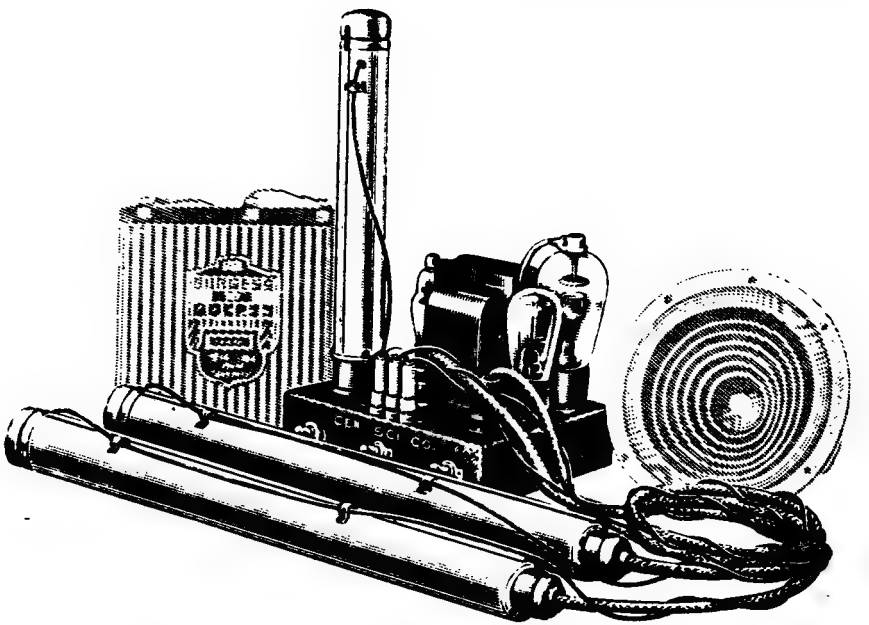
Perhaps I should at this point mention an interesting but not generally accepted particle. A physicist at the California Institute of Technology set up elaborate apparatus, and, after going through the usual motions, got absolutely no trace on the photographic plate. He immediately deduced a particle of no charge and no mass, which he named the nonon.

Reverting to serious science, we find Yukawa in 1935 hypothesizing a charged particle of mass intermediate between that of the electron and the proton and of short life. Whether this was a lucky guess or a shrewd prediction, similar particles soon appeared. In 1936 Anderson, the same man who

"Geiger-Müller counter"

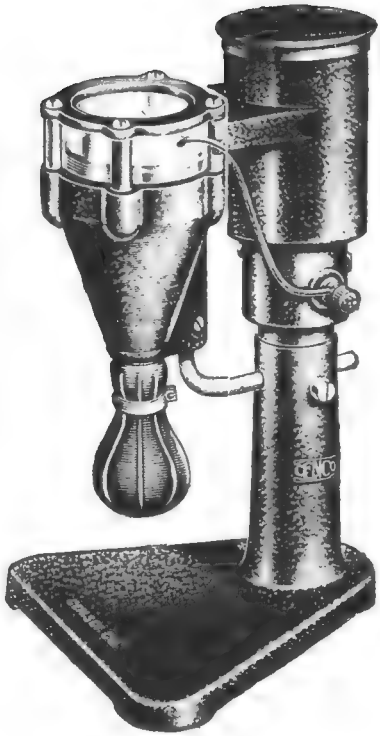
The long tubes to the fore contain gas at low pressure. A high voltage is applied between electrodes in each tube. When an ionizing particle penetrates a tube, it causes a breakdown or gaseous discharge—like that in a neon tube. The attached circuit causes a light to flash or a click from a speaker. In a "coincidence counter" of the type shown, there is a flash or click only if the particle penetrates both tubes. This makes it possible to count particles from a single direction. More elaborate counter circuits have devices which tally up the counts, using electronic counter systems.

Courtesy of the Central Scientific Company



The cloud chamber was invented by C. T. R. Wilson in 1899. The air in a chamber with transparent walls is held at one hundred percent relative humidity. When the pressure is suddenly lowered, the water tends to condense as a fog. If an ionizing particle such as an electron, positron, proton or mesotron passes through the chamber, it leaves behind a trail of ions; the water vapor tends to condense around these, making a foggy track where particles passed. Gamma rays don't show.

Courtesy of the Central Scientific Company



had earlier discovered the positive electron or positron, observed them during cosmic ray studies, and they are now accepted under the name mesotron, which he gave them. Sometimes, the mesotron is called the meson. Other christenings, such as barytron and the somewhat frivolous Yukon, have not survived.

Mesotrons are strange creatures. They are, like positrons, short-lived. Apparently, they are the ephemeral by-products of violent nuclear reactions engendered chiefly by hard, highly energetic cosmic rays. Mesotrons are generally thought of as having a mass about two hundred times that of the electron and approximately electronic charge, either positive or negative. They endure on the average about a millionth of a second. But, either experiments are crude and erratic, or there is something very queer about the mesotron, for some experiments indicate lighter mesotrons, and others seem to indicate mesotrons which may last only a hundred-thousandth of a millionth of a second. In all, there is neither a generally accepted theory of the nature of the mesotron, from which to deduce its mass and charge, nor is there adequate experimental data to pin

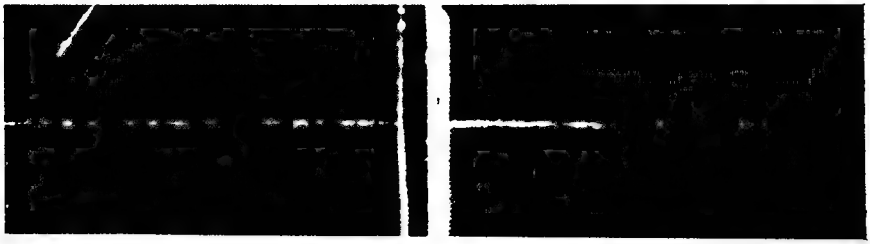
Darrow's "Particles of the Cosmic Ray"

If the air is expanded some time after the passage of a charged particle, the ions left behind by the particle will have drifted apart and the fog droplets forming about the ions will be well separated. By counting the droplets, the ions can be counted, and the ionizing ability of the particle so determined. As the ionizing ability depends on the speed and the nature of the particle, this gives a clue to the particle's identity. (Corson and Brode, University of California.)

down its properties. Or is the mesotron one particle with unique properties? And here comes the new theory.

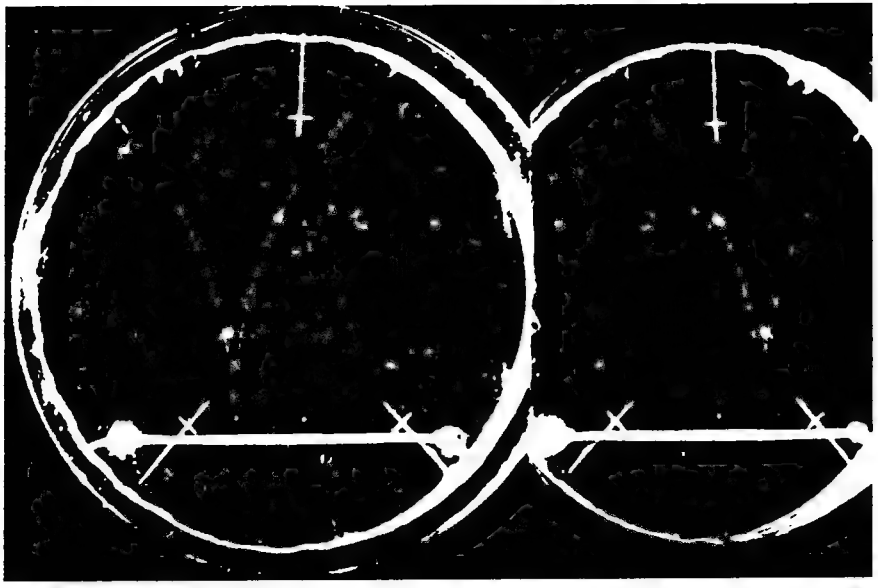
Professor J. A. Wheeler of Princeton University has recently suggested, with some indirection, that mesotrons might just conceivably be a sort of phony atom. Professor Wheeler modestly calls the hypothetical particles he discusses *electro-mesons,* insists that they are in all likelihood quite different from the garden variety of mesotron, and even solicits new and less confusing names. Does he protest too much? Let us see what he has to say.

We currently have two more or less complementary pictures of the atom. A hydrogen atom may be considered, for instance, as having a central heavy positive particle, a proton, around which revolves a light negative particle, an electron.



Darrow's "Particles of the Cosmic Ray"

Besides intensity of ionization and curvature of path in a magnetic field, the ability of particles to penetrate metal barriers forms a third clue to their nature. Here we see the track of a mesotron which has penetrated a metal barrier without sensible deflection. (Auger, University of Paris.)



Darrow's "Particles of the Cosmic Ray"

This is a stereoscopic view of a Wilson cloud chamber. When there is a strong magnetic field in the chamber, the paths of charged particles are curved. The radius of curvature depends on the charge to mass ratio of the particle and on its speed. Like the intensity of ionization, the path curvature is a clue to the nature of the particle. The photograph shows two particles produced by a photon near the bottom of the picture. As the paths curve in different directions, the particles have opposite charges; they are an electron and a positron. (W. A. Fowler, California Institute of Technology.)

The massy proton remains practically fixed, as does our sun, and the electron circles it like a planet. This relationship is illustrated in Figure 1a. The alternative picture involves the nucleus and a sort of vague wave of probability surrounding it; this has been symbolized in Figure 1b. The intensity—illustrated as darkness—of the wave at a given point is a measure of the probability that the electron is in that vicinity.

In either case, according to quantum mechanics, only certain *states* are possible. In the picture of Figure 1a, these correspond to certain allowed orbits. The state in which the electron is nearest to the nucleus is called the *ground state* and represents the usual condition of the atom. For other *excited states* the orbits are more remote. Atoms are put into these excited states by collision or absorption of radiation. If the

electron is torn completely away, the atom is said to be *ionized,* and the atom minus its electron is an *ion.* As the hydrogen atom has only one electron to lose, the hydrogen ion, all that remains after the electron is gone, is merely a proton. If an electron falls back to an excited state orbit or to the ground state, a characteristic spectral line is emitted, and characteristic radiation can also be emitted when an electron falls from an outer to an inner orbit. In the picture of Figure 1b the various states are represented by larger and more complicated *wave functions* or distributions of probability.

If we find the wave theory disturbing or have difficulty reconciling it with our usual conceptions, perhaps we must be satisfied to know that the theory by which such waves are calculated accurately predicts the properties of hydrogen and many light elements. I might add further that Professor Wheeler and other physicists talk in an easy way first about one picture and then about the other as if the seeming differences were not confusing at all.

Now, what Professor Wheeler has to suggest is just this: Suppose two electronic particles, an ephemeral positron and a negative electron, got together in a sort of double star arrangement, revolving about their common center of gravity, as shown in Figure 2. This is a neutral combination, a sort of phony atom. It has about 1/900 the mass of a hydrogen

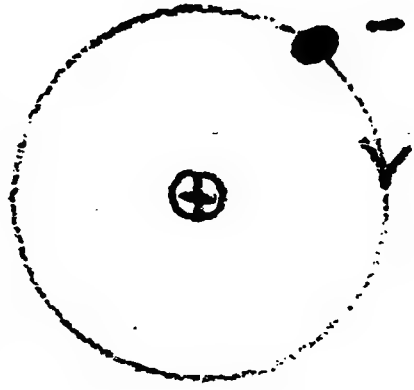


Fig. 1a.

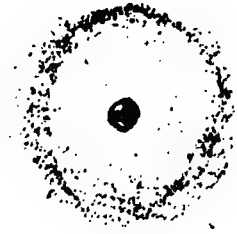


Fig. 1b.

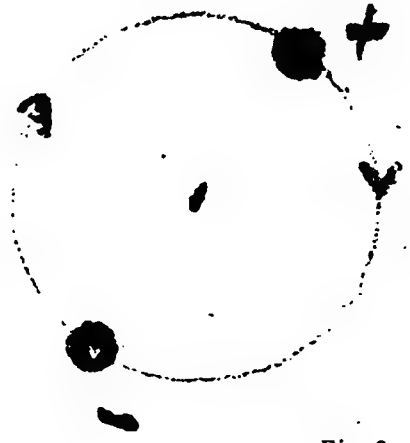
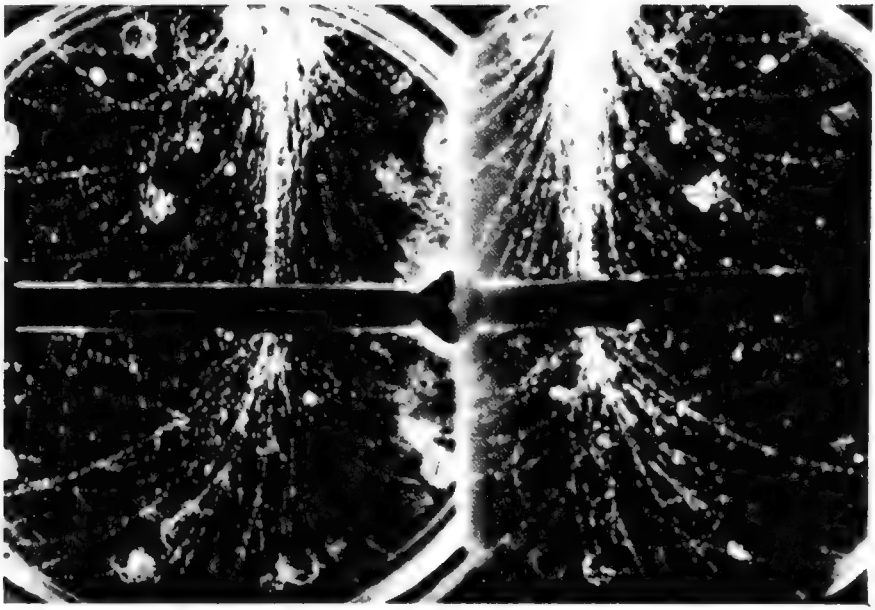


Fig. 2



Darrow's "Particles of the Cosmic Ray"

A shower of slow electrons. (Anderson and Naddermeyer, California Institute of Technology.)

atom—what a wonderful substance for filling balloons! But is this a mere pipe dream? Perhaps such a system would fly apart, giving off energy as it disintegrated.

The methods of wave mechanics, which have been so successfully used in predicting the properties of hydrogen, can be applied to this hypothetical system. The gratifying result is that it should take an energy of about 6.77 electron-volts to break up such a system, about half the energy required to remove the electron from a hydrogen atom, ionizing it completely. Thus, the system has a degree of stability.

Of course, this system is nothing like a mesotron. It has only twice the mass of an electron, not two hundred times. Further, it will eventually commit suicide. By suicide I do not mean death by bumping into or by being assaulted by other particles, although such a system would be very delicate in this respect, and certainly could not survive long in our crowded lower atmosphere. Any Methuselah among such combinations would have to live in the uncrowded regions of our very upper atmosphere. To understand the theory of suicide, remember that in Figure 1b, illustrating the wave atom, the darkness at a point in the vague cloud surrounding the nucleus indicates the probability

of finding the electron in that vicinity. Now, this probability is greatest in the vicinity of the orbit of the "particle atom" of Figure 1a, but it is by no means zero at the nucleus. A similar condition holds for the positron-electron system of Figure 2, for which I feel quite incompetent to draw a picture. Such a picture would show that there is a finite probability of the electron and the positron being at the same point. From the theory which has been built up about positrons, it is known that if a positron and an electron get together, within a short time—averaging, say, a time t—the two will combine and produce two gamma-ray photons. Multiplying this mean time of combinations by the probability of coincidence, derived from the wave function, it is found that such a system should persist on the average for a one hundred thousandth of a millionth of a second. In this time, the electron and positron would execute about a hundred thousand revolutions around one another, so in this sense the life is appreciable.

If we put such a system into an excited state, that is, add enough energy, say, from a gamma ray, to move the particles into wider-sweeping orbits, we might expect the chances of annihilation to be less, since the particles are further apart. Calculations confirm this, and, in fact, indicate that the lifetime increases as the cube of the quantum number—the number of the orbit, counting allowed orbits outward from the nucleus with the inmost orbit numbered one.

As yet, nothing has been said about spin. Electrons and positrons have a certain spin or angular momentum. When, or perhaps I should say if, two of these particles were revolving about one another, the spins could be in the same or in opposite directions. We have in fact been talking entirely about cases in which the spins are opposite. It may be calculated that if the spins were the same, the wave function would be such that the probability of the particles coinciding would be much less, and hence annihilation would take longer to occur. In fact, it would take about a hundred thousand times as long, bringing the life as limited by annihilation up to around a millionth of a second. which is also the life of cosmic-ray mesotrons.

So far we have talked about the properties these electro-mesons or phony atoms would have if they were in existence. What about their formation? Professor Wheeler believes that there is a pretty fair probability of the opposite-spin short-lived sort of system being formed by the collision of a gamma ray with an atomic nucleus. It is possible that either this sort of pair, or a long-lived system of two particles with the same spins, could be formed simply by the capture of an electron by a positron—really, by a sort of mutual capture—especially in a

complicated milieu of many electrons, positrons, and gamma rays.

Still, mere speculations about the formation of such particles are unsatisfactory in answering the question: are there such particles? How could they be detected? We have mentioned that when a hydrogen nucleus (proton) captures an electron, forming a hydrogen atom, a characteristic radiation or spectral line is emitted. Likewise, when the electron falls from an outer, excited state, orbit, to an inner, excited state, orbit, or to the inmost, ground state, orbit, other spectral lines are produced. All of these lines together form the well-known spectrum of hydrogen. Further, by wave mechanics the positions of these lines can be calculated with great exactitude from the mere knowledge that a hydrogen atom consists of a proton and an electron. The agreement between the theoretical and the experimental values is well-nigh perfect, and this gives us confidence that the spectrum of positron-electron pairs should be equally predictable and checkable. Why not merely look for the calculated spectrum in places where we might find these phony atoms?

Here we run into an unprecedented difficulty. The situation would be bad enough if we were to be troubled by the rarity and short endurance of these pairs merely, but in addition there is—their unprecedently low mass.

If an atom is to be put into an excited state so that it can radiate, it must be struck by something. This may be a material particle or a quantum of electromagnetic radiation. Usually, in such an excitation of an atom there is some energy left over, and this appears partly as a change in velocity of the excited atom.

Now, by our gross standards a hydrogen atom is exceedingly light; compared with our hypothetical positron-electron pair it is as massy as the Rock of Gibraltar and just about as immovable. A process of excitation which would leave a hydrogen atom to all intents and purposes stationary would send one of our phony atoms skittering away at a good fraction of the speed of light. What of this? Merely that the spectrum of a group of excited positron-electron systems moving in random directions at such speeds would be so broadened and confused by the Doppler effect that it would be undetectable.

Is there any hope, then, of identifying such particles? If we rely on the spectroscope, there are two possibilities. One, rather remote, is that of finding some exciting means which will just barely excite the system, with no energy left over to send the particle flying. A more hopeful possibility which Professor Wheeler pointed out is the investigation of molecular spectra.

What is hydrogen chloride but a combination of a negatively ionized chlorine atom with a positively ionized hydrogen atom?

$$HCl = H^{+} + Cl^{-}$$

A positively ionized hydrogen atom is merely a proton. What about a compound of a chlorine ion and a positron, which we will regard for the moment as a very phony hydrogen ion?

$$eCl = e^{+} + Cl^{-}$$

Our phony compound, e Cl, is almost as heavy as hydrogen chloride; thus, it cannot be easily knocked about. It should have a molecular spectrum. Will some ingenious experimenter find this spectrum, and the theory?

But let us return to theorizing and pursue it further. As there are many atoms, in fact, a whole periodic table of them, why should there not be correspondingly many phony atoms? Professor Wheeler has made a first step toward investigating this possibility theoretically, by calculating the energies necessary to separate various combinations of positrons and electrons. Calling M^{+-} a combination of an electron and a positron, M^{++-} a combination of two positrons and an electron, et cetera, he finds some energies of combination to be

M^{+-}	6.77 electron volts
M^{++-}	6.96 " "
M^{---+}	" " "
M^{++--}	over 9.93 electron volts

This tells us that M^{++--} or M^{---+} cannot spontaneously break up into M^{+-} plus a positron or electron, for such a transformation requires an addition of energy. Further, M^{++--} cannot become M^{+-} or M^{--+}. If the energy, which we only know to be larger than 9.93 electron volts, is actually greater than two times 6.77 or 13.54 electron volts—as it may well be—M^{++--} could not break up into $2M^{+-}$. As the phony elements become more complicated, it is increasingly difficult to calculate their properties, and we still wonder, can there be a system of, say, one hundred one positrons and one hundred electrons? Such a system would have the charge and mass of a cosmic ray mesotron. Can this be what some cosmic ray mesotrons are?

We would feel better equipped to answer if we had some further information about mesotrons. Particularly, we want to know:

(1) Do mesotrons have various lifetimes comparable to the spread predicted for phony atoms?

(2) A phony atom would be physically very large compared with a simple particle such as a proton. Is this consistent with the behavior of mesotrons?

(3) Do mesotrons ever decay partially into particles of smaller mass and perhaps of different charge, as phony atoms might?

(4) Do mesotrons always have masses integral multiples of the electronic mass—as phony atoms would, very nearly?

To answer these questions will require further theoretical probing and experimental work of hitherto unattained accuracy.

At any rate, you are in on the ground floor!

THE END.

Placet Is A Crazy Place

by FREDRIC BROWN

It wasn't that Placet itself was so crazy; it was just that the things Placet's gravitic situation did to human sensory organs was really remarkable. You could even solve impossible problems quite unintentionally—

Illustrated by Swenson

Even when you're used to it, it gets you down sometimes. Like that morning—if you can call it a morning. Really, it was night. But we go by Earth time on Placet because Placet time would be as screwy as everything else on that goofy planet. I mean, you'd have a six-hour day and then a two-hour night and then a fifteen-hour

day and a one-hour night and—well, you just couldn't keep time on a planet that does a figure-eight orbit around two dissimilar suns, going like a bat out of hell around and between them, and the suns going around each other so fast and so comparatively close that Earth astronomers thought it was only one sun until the Blakeslee expedition landed here twenty years ago.

You see, the rotation of Placet isn't any even fraction of the period of its orbit and there's the Blakeslee Field in the middle between the suns—a field in which light rays slow down to a crawl and get left behind and—well—

If you've not read the Blakeslee reports on Placet, hold on to something, while I tell you this:

Placet is the only known planet that can eclipse itself twice at the same time, run headlong into itself every forty hours, and then chase itself out of sight.

I don't blame you.

I didn't believe it either, and it scared me stiff the first time I stood on Placet and saw Placet coming head-on to run into us. And yet I'd read the Blakeslee reports and knew what was really happening, and why. It's rather like those early movies when the camera was set up in front of a train and the audience saw the locomotive heading right toward them and would feel an impulse to run even though they knew the locomotive wasn't really there.

But I started to say, like that morning. I was sitting at my desk, the top of which was covered with grass. My feet were—or seemed to be—resting on a sheet of rippling water. But it wasn't wet.

On top of the grass of my desk lay a pink flowerpot, into which, nose-first, stuck a bright green Saturnian lizard. That—reason and not my eyesight told me—was my pen and inkwell. Also an embroidered sampler that said "God Bless Our Home" in neat cross-stitching. It actually was a message from Earth Center which had just come in on the radiotype. I didn't know what it said because I'd come into my office after the B. F. effect had started. I didn't think it really said "God Bless Our Home" because it seemed to. And just then I was mad, I was fed up, and I didn't care a holler what it actually did say.

You see—maybe I'd better explain—the Blakeslee Field effect occurs when Placet is in mid-position between Argyle I and Argyle II, the two suns it figure-eights around. There's a scientific explanation of it, but it must be expressed in formulas, not in words. It boils down to this; Argyle I is terrene matter and Argyle II is contraterrene, or negative matter. Halfway between them—over a considerable stretch of territory—is a field in which light rays are slowed down, way down. They move at about the speed of sound. The result is that if something is moving faster than sound—as Placet itself does—you can still see it coming after it's passed

you. It takes the visual image of Placet twenty-six hours to get through the field. By that time, Placet has rounded one of its suns and meets its own image on the way back. In midfield, there's an image coming and an image going, and it eclipses itself twice, occulting both suns at the same time. A little farther on, it runs into itself coming from the opposite direction—and scares you stiff if you're watching, even if you know it's not really happening.

Let me explain it this way before you get dizzy. Say an old-fashioned locomotive is coming toward you, only at a speed much faster than sound. A mile away, it whistles. It passes you and *then* you hear the whistle, coming from the point a mile back where the locomotive isn't any more. That's the auditory effect of an object traveling faster than sound; what I've just described is the visual effect of an object traveling—in a figure-eight orbit—faster than its own visual image.

That isn't the worst of it; you can stay indoors and avoid the eclipsing and the head-on collisions, but you can't avoid the physio-psychological effect of the Blakeslee Field.

And that, the physio-psychological effect, is something else again. The field does something to the optic nerve centers, or to the part of the brain to which the optic nerves connect, something similar to the effect of certain drugs. You have —you can't exactly call them hallucinations, because you don't ordinarily see things that aren't there, but you get an illusory picture of what *is* there.

I knew perfectly well that I was sitting at a desk the top of which was glass, and not grass; that the floor under my feet was ordinary plastiplate and not a sheet of rippling water; that the objects on my desk were not a pink flowerpot with a Saturnian lizard sticking in it, but an antique twentieth century inkwell and pen —and that the "God Bless Our Home" sampler was a radiotype message on ordinary radiotype paper. I could verify any of those things by my sense of touch, which the Blakeslee Field doesn't affect.

You *can* close your eyes, of course, but you don't—because even at the height of the effect, your eyesight gives you the relative size and distance of things and if you stay in familiar territory your memory and your reason tell you what they are.

So when the door opened and a two-headed monster walked in, I knew it was Reagan. Reagan isn't a two-headed monster, but I could recognize the sound of his walk.

I said, "Yes, Reagan?"

The two-headed monster said, "Chief, the machine shop is wobbling. We may have to break the rule not to do any work in mid-period."

"Birds?" I asked.

Both of his heads nodded. "The underground part of those walls

must be like sieves from the birds flying through 'em, and we'd better pour concrete quick. Do you think those new alloy reinforcing bars the *Ark*'ll bring will stop them?"

"Sure," I lied. Forgetting the field, I turned to look at the clock, but there was a funeral wreath of white lilies on the wall where the clock should have been. You can't tell time from a funeral wreath. I said, "I was hoping we wouldn't have to reinforce those walls till we had the bars to sink in them. The *Ark's* about due; they're probably hovering outside right now waiting for us to come out of the field. You think we could wait till—"

There was a crash.

"Yeah, we can wait," Reagan said. "There went the machine shop, so there's no hurry at all."

"Nobody was in there?"

"Nope, but I'll make sure." He ran out.

That's what life on Placet is like. I've had enough of it; I'd had too much of it. I made up my mind while Reagan was gone.

When he came back, he was a bright blue articulated skeleton.

He said, "O. K., Chief. Nobody was inside."

"Any of the machines badly smashed?"

He laughed. "Can you look at a rubber beach horse with purple polka dots and tell whether it's an intact lathe or a busted one? Say, chief, you know what you look like?"

I said, "If you tell me, you're fired."

I don't know whether I was kidding or not; I was plenty on edge. I opened the drawer of my desk and put the "God Bless Our Home" sampler in it and slammed the drawer shut. I was fed up. Placet is a crazy place and if you stay there long enough you go crazy yourself. One out of ten of Earth Center's Placet employees has to go back to Earth for psychopathic treatment after a year or two on Placet. And I'd been there three years, almost. My contract was up. I made my mind up, too.

"Reagan," I said.

He'd been heading for the door. He turned. "Yeah, chief?"

I said, "I want you to send a message on the radiotype to Earth Center. And get it straight, two words: *I quit.*"

He said, "O. K., chief." He went on out and closed the door.

I sat back and closed my eyes to think. I'd done it now. Unless I ran after Reagan and told him not to send the message, it was done and over and irrevocable. Earth Center's funny that way; the board is plenty generous in some directions, but once you resign they never let you change your mind. It's practically an iron-clad rule and ninety-nine times out of a hundred it's justified on interplanetary and intragalactic projects. A man must be a hundred percent enthusiastic about his job to make a go of it, and once

he's turned against it, he's lost the keen edge.

I knew the midperiod was about over, but I sat there with my eyes closed just the same. I didn't want to open them to look at the clock until I could see the clock *as* a clock and not as whatever it might be this time. I sat there and thought.

I felt a bit hurt about Reagan's casualness in accepting the message. He'd been a good friend of mine for ten years; he could at least have said he was sorry I was going to leave. Of course, there was a fair chance that he might get the promotion, but even if he was thinking about that, he could have been diplomatic about it. At least, he could have—

Oh, quit feeling sorry for yourself, I told myself. *You're through with Placet and you're through with Earth Center, and you're going back to Earth pretty soon now, as soon as they relieve you, and you can get another job there, probably teaching again.*

But darn Reagan, just the same. He'd been my student at Earth City Poly, and I'd got him this Placet job and it was a good one for a youngster his age, assistant administrator of a planet with nearly a thousand population. For that matter, my job was a good one for a man *my* age—I'm only thirty-one myself. An excellent job, except that you couldn't put up a building that wouldn't fall down again and—*Quit crabbing,* I told myself; *you're through with it now. Back to Earth and a teaching job again. Forget it.*

I was tired. I put my head on my arms on top of the desk, and I must have dozed off for a minute.

I looked up at the sound of footsteps coming through the doorway; they weren't Reagan's footsteps. The illusions were getting better now, I saw. It was—or appeared to be—a gorgeous redhead. It couldn't be, of course. There are a few women on Placet, mostly wives of technicians, but—

She said, "Don't you remember me, Mr. Rand?" It was a woman; her voice was a woman's voice, and a beautiful voice. Sounded vaguely familiar, too.

"Don't be silly," I said; "how can I recognize you at midper—" My eyes suddenly caught a glimpse of the clock past her shoulder, and it *was* a clock and not a funeral wreath or a cuckoo's nest, and I realized suddenly that everything else in the room was back to normal. And that meant midperiod was over, and I wasn't seeing things.

My eyes went back to the redhead. She must be real, I realized. And suddenly I knew her, although she'd changed, changed plenty. All changes were improvements, although Michaelina Witt had been a very pretty girl when she'd been in my Extraterrestrial Botany III class at Earth City Polytech four . . . no, five years ago.

She'd been pretty, then. Now she was beautiful. She was stun-

ning. How had the teletalkies missed her? Or had they? What was she doing *here?* She must have just got off the *Ark*, but— I realized I was still gawking at her. I stood up so fast I almost fell across the desk.

"Of course I remember you, Miss Witt," I stammered. "Won't you sit down? How did you come here? Have they relaxed the no-visitors rule?"

She shook her head, smiling. "I'm not a visitor, Mr. Rand. Center advertised for a technician-secretary for you, and I tried for the job and got it, subject to your approval, of course. I'm on probation for a month, that is."

"Wonderful," I said. It was a masterpiece of understatement. I started to elaborate on it: "Marvelous—"

There was the sound of someone clearing his throat. I looked around; Reagan was in the doorway. This time not as a blue skeleton or a two-headed monster. Just plain Reagan.

He said, "Answer to your radiotype just came." He crossed over and dropped it on my desk. I looked at it. "O. K. August 19th," it read. My momentary wild hope that they'd failed to accept my resignation went down among the widgie birds. They'd been as brief about it as I'd been.

August 19th—the next arrival of the *Ark*. They certainly weren't wasting any time—mine or theirs. Four days!

Reagan said, "I thought you'd want to know right away, Phil."

"Yeah," I told him. I glared at him. "Thanks." With a touch of spite—or maybe more than a touch—I thought, *well, my bucko, you don't get the job, or that message would have said so; they're sending a replacement on the next shuttle of the* Ark.

But I didn't say that; the veneer of civilization was too thick. I said, "Miss Witt, I'd like you to meet—" They looked at each other and started to laugh, and I remembered. Of course, Reagan and Michaelina had both been in my botany class, as had Michaelina's twin brother, Ichabod. Only, of course, no one ever called the red-headed twins Michaelina and Ichabod. It was Mike and Ike, once you knew them.

Reagan said, "I met Mike getting off the *Ark*. I told her how to find your office, since you weren't there to do the honors."

"Thanks," I said. "Did the reinforcing bars come?"

"Guess so. They unloaded some crates. They were in a hurry to pull out again. They've gone."

I grunted.

Reagan said, "Well, I'll check the ladings. Just came to give you the radiotype; thought you'd want the good news right away."

He went out, and I glared after him. The louse. The—

Michaelina said, "Am I to start to work right away, Mr. Rand?"

I straightened out my face and managed a smile. "Of course not," I told her. "You'll want to look around the place, first. See the scenery and get acclimated.

Want to stroll into the village for a drink?"

"Of course."

We strolled down the path toward the little cluster of buildings, all small, one-story, and square.

She said, "It's . . . it's nice. Feels like I'm walking on air, I'm so light. Exactly what is the gravity?"

"Point seven four," I said. "If you weigh . . . um-m, a hundred twenty pounds on Earth, you weigh about eighty-nine pounds here. And on you, it looks good."

She laughed. "Thank you, professor— Oh, that's right; you're not a professor now. You're now my boss, and I must call you Mr. Rand."

"Unless you're willing to make it Phil, Michaelina."

"If you'd call me Mike; I detest Michaelina, almost as much as Ike hates Ichabod."

"How is Ike?"

"Fine. Has a student-instructor job at Poly, but he doesn't like it much." She looked ahead at the village. "Why so many small buildings instead of a few bigger ones?"

"Because the average life of a structure of any kind on Placet is about three weeks. And you never know when one is going to fall down—with someone inside. It's our biggest problem. All we can do is make them small and light, except the foundations, which we make as strong as possible. Thus far, nobody has been hurt seriously in the collapse of a building, for that reason, but— Did you feel that?"

"The vibration? What was it, an earthquake?"

"No," I said. "It was a flight of birds."

"What?"

I had to laugh at the expression on her face. I said, "Placet is a crazy place. A minute ago, you said you felt as though you were walking on air. Well, in a way, you are doing just exactly that. Placet is one of the rare objects in the Universe that is composed of both ordinary and *heavy* matter. Matter with a collapsed molecular structure, so heavy you couldn't lift a pebble of it. Placet has a core of that stuff; that's why this tiny planet, which has an area about twice the size of Manhattan Island, has a gravity three-quarters that of Earth. There is life—animal life, not intelligent—living on the core. There are birds, whose molecular structure is like that of the planet's core, so dense that ordinary matter is as tenuous to them as air is to us. They actually *fly* through it, as birds on Earth fly through the air. From their standpoint, we're walking on top of Placet's atmosphere."

"And the vibration of their flight under the surface makes the houses collapse?"

"Yes, and worse—they fly right through the foundations, no matter what we make them of. Any matter we can work with is just so much gas to them. They fly

through iron or steel as easily as through sand or loam. I've just got a shipment of some specially tough stuff from Earth—the special alloy steel you heard me ask Reagan about—but I haven't much hope of it doing any good."

"But aren't those birds dangerous? I mean, aside from making the buildings fall down. Couldn't one get up enough momentum flying to carry it out of the ground and into the air a little way? And wouldn't it go right through anyone who happened to be there?"

"It would," I said, "but it doesn't. I mean, they never fly closer to the surface than a few feet. Some sense seems to tell them when they're nearing the top of their 'atmosphere.' Something analogous to the supersonics a bat uses. You know, of course, how a bat can fly in utter darkness and never fly into a solid object."

"Like radar, yes."

"Like radar, yes, except a bat uses sound waves instead of radio waves. And the widgie birds must use something that works on the same principle, in reverse; turns them back a few feet before they approach what to them would be the equivalent of a vacuum. Being heavy-matter, they could no more exist or fly in air than a bird could exist or fly in a vacuum."

While we were having a cocktail apiece in the village, Michaelina mentioned her brother again. She said, "Ike doesn't like teaching at all, Phil. Is there any chance at all that you could get him a job here on Placet?"

I said, "I've been badgering Earth Center for another administrative assistant. The work is increasing plenty since we've got more of the surface under cultivation. Reagan really needs help. I'll—"

Her whole face was alight with eagerness. And I remembered. I was through. I'd resigned, and Earth Center would pay as much attention to any recommendation of mine as though I were a widgie bird. I finished weakly, "I'll . . . I'll see if I can do anything about it."

She said, "Thanks—Phil." My hand was on the table beside my glass, and for a second she put hers over it. All right, it's a hackneyed metaphor to say it felt as though a high-voltage current went through me. But it did, and it was a mental shock as well as a physical one, because I realized then and there that I was head over heels. I'd fallen harder than any of Placet's buildings ever had. The thump left me breathless. I wasn't watching Michaelina's face, but from the way she pressed her hand harder against mine for a millisecond and then jerked it away as though from a flame, she must have felt a little of that current, too.

I stood up a little shakily and suggested that we walk back to headquarters.

Because the situation was completely impossible, now. Now that Center had accepted my resignation and I was without visible or invisible means of support. In a

psychotic moment, I'd cooked my own goose. I wasn't even sure I could get a teaching job. Earth Center is the most powerful organization in the Universe and has a finger in every pie. If they blacklisted me—

Walking back, I let Michaelina do most of the talking; I had some heavy thinking to do. I wanted to tell her the truth—and I didn't want to.

Between monosyllabic answers, I fought it out with myself. And, finally, lost. Or won. I'd not tell her—until just before the next coming of the *Ark*. I'd pretend everything was O. K. and normal for that long, give myself that much chance to see if Michaelina would fall for me. That much of a break I'd give myself. A chance, for four days.

And then—well, if by then she'd come to feel about me the way I did about her, I'd tell her what a fool I'd been and tell her I'd like to— No, I wouldn't let her return to Earth with me, even if she wanted to, until I saw light ahead through a foggy future. All I could tell her was that if and when I had a chance of working my way up again to a decent job—and after all I was still only thirty-one and might be able to—

That sort of thing.

Reagan was waiting in my office, looking as mad as a wet hornet. He said, "Those saps at Earth Center shipping department gummed things again. Those crates of special steel—aren't."

"Aren't what?"

"Aren't a n y t h i n g. They're empty crates. Something went wrong with the crating machine and they never knew it."

"Are you sure that's what those crates were supposed to contain?"

"Sure I'm sure. Everything else on the order came, and the ladings specified the steel for those particular crates." He ran a hand through his tousled hair. It made him look more like an airedale than he usually does.

I grinned at him. "Maybe it's invisible steel."

"Invisible, weightless and intangible. Can *I* word the message to Center telling them about it?"

"Go as far as you like," I told him. "Wait here a minute, though. I'll show Mike where her quarters are and then I want to talk to you a minute."

I took Michaelina to the best available sleeping cabin of the cluster around headquarters. She thanked me again for trying to get Ike a job here, and I felt lower than a widgie bird's grave when I went back to my office.

"Yeah, chief?" Reagan said.

"About that message to Earth," I told him. "I mean the one I sent this morning. I don't want you to say anything about it to Michaelina."

He chuckled. "Want to tell her yourself, huh? O. K., I'll keep my yap shut."

I said, a bit wryly, "Maybe I was foolish sending it."

"Huh?" he said. "I'm sure glad you did. Swell idea."

He went out, and I managed not to throw anything at him.

The next day was a Tuesday, if that matters. I remember it as the day I solved one of Placet's two major problems. An ironic time to do it, maybe.

I was dictating some notes on greenwort culture—Placet's importance to Earth is, of course, the fact that certain plants native to the place and which won't grow anywhere else yield derivatives that have become important to the pharmacopoeia. I was having heavy sledding because I was watching Michaelina take the notes; she'd insisted on starting work her second day on Placet.

And suddenly, out of a clear sky and out of a muggy mind, came an idea. I stopped dictating and rang for Reagan. He came in.

"Reagan," I said, "order five thousand ampoules of J-17 Conditioner. Tell 'em to rush it."

"Chief, don't you remember? We tried the stuff. Thought it might condition us to see normally in midperiod, but it didn't affect the optic nerves. We still saw screwy. It's great for conditioning people to high or low temperatures or—"

"Or long or short waking-sleeping periods," I interrupted him. "That's what I'm talking about, Reagan. Look, revolving around two suns, Placet has such short and irregular periods of light and dark that we never took them seriously. Right?"

"Sure, but—"

"But since there's no logical Placet day and night we could use, we made ourselves slaves to a sun so far away we can't see it. We use a twenty-four hour day. But midperiod occurs every twenty hours, regularly. We can use conditioner to adapt ourselves to a *twenty*-hour day—six hours sleep, twelve awake—with everybody blissfully sleeping through the period when their eyes play tricks on them. And in a darkened sleeping room so you couldn't see anything, even if you woke up. More and shorter days per year—and nobody goes psychopathic on us. Tell me what's wrong with it."

His eyes went bleak and blank and he hit his forehead a resounding whack with the palm of his hand.

He said, "Too simple, that's what's wrong with it. So darned simple only a genius could see it. For two years I've been going slowly nuts and the answer so easy nobody could see it. I'll put the order in right away."

He started out and then turned back. "Now how do we keep the buildings up? Quick, while you're fey or whatever you are."

I laughed. I said, "Why not try that invisible steel of yours in the empty crates?"

He said, "Nuts," and closed the door.

And the next day was a Wednesday and I knocked off work and

took Michaelina on a walking tour around Placet. Once around is just a nice day's hike. But with

Michaelina Witt, any day's hike would be a nice day's hike. Except, of course, that I knew I had only one more full day to spend with her. The world would end on Friday.

Tomorrow the *Ark* would leave Earth, with the shipment of conditioner that would solve one of our problems—and with whomever Earth Center was sending to take my place. It would warp through space to a point a safe distance outside the Argyle I-II system and come in on rocket power from there. It would be here Friday, and I'd go back with it. But I tried not to think about that.

I pretty well managed to forget it until we got back to headquarters and Reagan met me with a grin that split his homely mug into horizontal halves. He said, "Chief, you did it."

"Swell," I said. "I did what?"

"Gave me the answer what to use for reinforcing foundations. You solved the problem."

"Yeah?" I said.

"Yeah. Didn't he, Mike?"

Michaelina looked as puzzled as I must have. She said, "He was kidding. He said to use the stuff in the empty crates, didn't he?"

Reagan grinned again. "He just thought he was kidding. That's what we're going to use from now on. Nothing. Look, Chief, it's like the conditioner—so simple we never thought of it. Until you told me to use what was in the empty crates, and I got to thinking it over."

I stood thinking a moment myself, and then I did what Reagan had done the day before—hit myself a whack on the forehead with the heel of my palm.

Michaelina still looked puzzled.

"Hollow foundations," I told her. "What's the one thing widgie birds won't fly through? *Air*. We can make buildings as big as we need them, now. For foundations, we sink double walls with a wide air space between. We can—"

I stopped, because it wasn't "we" any more. *They* could do it after I was back on Earth looking for a job.

And Thursday went and Friday came.

I was working, up till the last minute, because it was the easiest thing to do. With Reagan and Michaelina helping me, I was making out material lists for our new construction projects. First, a three-story building of about forty rooms for a headquarters building.

We were working fast, because it would be midperiod shortly, and you can't do paper work when you can't read and can write only by feel.

But my mind was on the *Ark*. I picked up the phone and called the radiotype shack to ask about it.

"Just got a call from them," said the operator. "They've warped in, but not close enough to land before midperiod. They'll land right after."

"O.K.," I said, abandoning the hope that they'd be a day late.

I got up and walked to the window. We were nearing midposition, all right. Up in the sky to the north I could see Placet coming toward us.

"Mike," I said. "Come here."

She joined me at the window and we stood there, watching. My arm was around her. I don't remember putting it there, but I didn't take it away, and she didn't move.

Behind us, Reagan cleared his throat. He said, "I'll give this much of the list to the operator. He can get it on the ether right after midperiod." He went out and shut the door behind him.

Michaelina seemed to move a little closer. We were both looking out the window at Placet rushing toward us. She said, "Beautiful, isn't it, Phil?"

"Yes," I said. But I turned, and I was looking at her face as I said it. Then—I hadn't meant to—I kissed her.

I went back, and sat down at my desk. She said, "Phil, what's the matter? You haven't got a wife and six kids hidden away somewhere, or something, have you? You were single when I had a crush on you at Earth Polytech—and I waited five years to get over it and didn't, and finally wangled a job on Placet just to— Do I have to do the proposing?"

I groaned. I didn't look at her. I said, "Mike, I'm nuts about you. But—just before you came, I sent a two-word radiotype to Earth. It said, 'I quit.' So I've got to leave Placet on this shuttle of the *Ark*, and I doubt if I can even get a teaching job, now that I've got Earth Center down on me, and—"

She said, "But, Phil!" and took a step toward me.

There was a knock on the door, Reagan's knock. I was glad, for once, of the interruption. I called out for him to come in, and he opened the door.

He said, "You told Mike yet, chief?"

I nodded, glumly.

Reagan grinned. "Good," he said; "I've been busting to tell her. It'll be swell to see Ike again."

"Huh?" I said. "Ike who?"

Reagan's grin faded. He said, "Phil, are you slipping, or something? Don't you remember giving me the answer to that Earth Center radiotype four days ago, just before Mike got here?"

I stared at him with my mouth open. I hadn't even read that radiotype, let alone answer it. Had Reagan gone psychopathic, or had I? I remembered shoving it in the drawer of my desk. I jerked open the drawer and pulled it out. My hand shook a little as I read it.

REQUEST FOR ADDITIONAL ASSISTANT GRANTED. WHOM DO YOU WANT FOR THE JOB?

I looked up at Reagan again. I said, "You're trying to tell me I sent an answer to this?"

He looked as dumfounded as I felt.

"You told me to," he said.

"What did I tell you to send?"

"Ike Witt." He stared at me. "Chief, are you feeling all right?"

I felt so all right something seemed to explode in my head. I stood up and started for Michaelina. I said, "Mike, will you marry me?" I got my arms around her, just in time, before midperiod closed down on us, so I couldn't see what she looked like, and vice versa. But over her shoulder, I could see what must be Reagan. I said, "Get out of here, you ape," and I spoke quite literally because that's exactly what he appeared to be. A bright yellow ape.

The floor was shaking under my feet, but other things were happening to me, too, and I didn't realize what the shaking meant until the ape turned back and yelled, "A flight of birds going under us, chief! Get out quick, before—"

But that was as far as he got before the house fell down around us and the tin roof hit my head and knocked me out. Placet is a crazy place. I like it.

THE END.

★ ★ ★

Pattern for Conquest

by GEORGE O. SMITH

Conclusion. *The true nature of conquest isn't always easy to determine—as a completely overwhelmed and conquered Earth had to demonstrate. It's so impractical to enslave a man brighter than you are—*

Illustrated by Kiluale

Synopsis

Because of their opposing natures, Clifford Lane and Stellor Downing are chosen for a mission by Toralen Ki and Hotang Lu, who are the Little Men of Tlembo. Coordinator Kennebec, the nominal ruler of the Solar Combine, sends Billy Thompson along to keep the other two out of each other's hair.

Both Stellor Downing and Clifford Lane are attracted to Patricia Kennebec, which is just another source of their never-ending battle.

The mission, not entirely understood by the Terrans, consists of destroying a machine sent forth by the Loard-vogh, a race that is conquering the Galaxy on a twenty-thousand-year program. This machine restricts mental activity through a vast area, thus permitting the Loard-vogh to advance without difficulty. Communication between the Little People of Tlembo and Terrans is also restricted by the machine, and so the true nature of the mission is not really known.

The three, Thompson, Downing, and Lane, take their commands and sally forth to destroy the machine. They find it passing through the system of Sscantoo, a stellar system populated with a race that evolved

from the feline instead of the primate. The feline race attacks viciously, resenting any interference, and they succeed in capturing Clifford Lane. Downing and Thompson set up a planet-mounted encampment on Sscantoo I and proceed to convert one of the catmen's type of weapons to their own concept, improving it considerably. Meanwhile, Lane makes the acquaintance of Linzete, the nominal head of the Sscantovians, and convinces him that the Terrans are there for the benefit of civilization. At the same time, the super weapon, a cutting sphere on the end of a beam, is used by Thompson and Downing as they return. This cutting sphere slices a midsection out of the catmen's spacecraft, proving the ability of the Terrans. Between Clifford Lane's extroverted nature and Downing's concentration, coupled with Thompson's scientific mind, the catmen are convinced that they must permit the Terrans to search through their system without interference.

The machine is found and destroyed, and the eternal rivals, their mission finished, go out to enjoy a bit of "rivet-cutting" which is a spaceborne version of the game of seeing how close they can come to one another without hitting. In other words, they are trying to fly the other out of space, in order to make him admit inferiority.

With the mental suppressor destroyed, Toralen Ki is able to communicate with Thompson through a telementor. Learning of the "rivet-cutting," Toralen Ki becomes excited and commands Thompson to order it stopped. The reason is that Lane and Downing, being of opposite personalities, are to fuse mentalities in a shock-excited condition, once they return to Terra. This will release all Terran minds from the mental lethargy caused by twenty thousand years of the mental suppressor.

Thompson smiles tolerantly and shakes his head, and Toralen Ki discovers that Billy is under the control of the Loard-vogh.

Toralen Ki, fighting for his life, invades Thompson's mind and a terrific mental struggle takes place which ends as Thompson's own mind becomes energized due to the mental shock. Thompson forces the Loard-vogh out, killing him as he manipulates his machine back on his home planet.

Lane and Downing are ordered to stop, which they do, finally. The party returns to Terra, and the mental transfer takes place. The transfer causes Toralen Ki's death.

This does not immediately increase the mentalities of all Terrans. They have the ability *for increased mentality, but lack the practice, experience, and necessary knowledge.*

Meanwhile, Vorgan, Lord of All, Ruler of the Loard-vogh, consults with Lindoo, his Head of Strategy, and they decide that with the mental suppressor destroyed and the energization having succeeded, that they must abandon their original plan and attack Terra immediately. They begin to make plans and start the wheels of attack in motion.

Toralen Ki is gone, but Hotang Lu informs the Terrans that Sol is in the center of a "mutation area" caused by the explosion of a contra-terrene sun many thousand years ago. The stellar bits are still dropping into suns in this area, causing a heavy bombardment of cosmic rays, causing mutation much faster than in other galactic locations. Solar bacterial, fungus, insect, and even animal life has evolved swiftly and dangerously for all of the rest of the Galaxy, and Lane admits having killed a Sscantovian guinea pig by merely holding it in his hand and innoculating it with fungus that to Lane is innocuous. The Loard-vogh know of Terra and Sol, and to them, the name of Sol III is the "Planet of Terror."

Still improving the cutting sphere, Thompson, having mental twinship with both Toralen Ki and the Loard-vogh known as Kregar, evolves an atomic sphere that compresses a small sphere of matter in any target, and then lets it explode. This produces a terrible atomic explosion.

Lane and Downing, being emotional opposites, find in their mental twinship that they no longer have their individual abilities because of indecisions created by the opposing factors. Thompson, meanwhile, takes command because of his stability, and Patricia Kennebec, long undecided between Lane and Downing, finds emotional stability in Billy Thompson.

The Loard-vogh attack, and Terra fights them all the way from the far interstellar outposts right down to Terra itself. Thompson tells of a secret weapon that must not be used until the time is ripe, and though all Solarians but Lane and Downing understand it, the Tlemban cannot understand Thompson's reasoning, and Hotang Lu becomes bitter because Thompson does not employ it immediately.

The Loard-vogh invade Terra, and can not be stopped. Inexorably they cover the planet, dying like flies because of the terrible microscopic growths found on Terra. But their numbers permit such devastation, and they continue to pour men and machines in until Terra is completely overrun.

Kennebec, Thompson, Lane, Downing, and Patricia are taken to the Loard-vogh encampment to deliver the formal surrender. They are told that the Loard-vogh finds them quite excellent fighters and superior strategists, and that all Solarians will be evacuated from the Planet of Terror to serve as Loard-vogh slaves in the already-conquered section of the Galaxy. Terra surrenders unconditionally and the evacuation begins.

XVII.

Lindoo's return from the Solar Sector was that of a conqueror. There were speeches and parades, and public demonstrations; and the hours wore by interminably. Lindoo knew just how important his victory had been, and yet how obvious had been his chances of winning. Even the Head of Strategy of a proud and tyrannical race

could feel within him the seeds of discontent. He suffered the publicity because such propaganda was necessary, and as soon as he could, he sought private audience with Vorgan.

"Hail the conquering hero," greeted Vorgan, as Lindoo entered. The tone was slightly sarcastic.

Lindoo was not hurt. "How many know?" he asked the Lord of All.

"Very few—thanks to a pleased fate."

"But we know," said Lindoo bitterly. "What a victory. A bulldozer crushing an ant hill; a pile driver smashing eggs; an elephant warding off mosquitoes."

"And yet," Vorgan told him, "unlimited freedom would build the ant hill beyond the ability of the bulldozer, and the mosquitoes could smother the elephant if their numbers filled the atmosphere. It was necessary."

Lindoo nodded. "We lost seventeen million of our first-line fighting men. They were bitter opponents."

"Think of what might have happened if they'd expanded for another two thousand years."

"That would be double their scientific history, I think," agreed Lindoo. "They've been expanding on a high order exponential curve. Another two thousand years would have put a barrier across the Galaxy with the Solar Sector at the center, and the Loard-vogh might never complete their plan. We acted rightly, Vorgan. But in spite of seventeen million men lost, and in spite of the danger to our plans, I feel that there is something strictly awry. They are an intelligent race. They must have known their inability to win—yet they fought like demons. We could well afford to lose seventeen million expendables. They could not, yet—?"

"Did they?"

"They must have. Our forces may have been overeager. An attacking force usually loses more than the defending force. Our fighter psychology is more battle-minded than theirs, for our soldiers are trained to think only in terms of battle. But even so, Vorgan, the tacticians and statisticians estimate that we could have lost no more than two to one. And granting that, it means a loss of eight and one half million men lost from the Solar Sector."

Vorgan thought that over. "They could ill afford to lose that many of their prime citizens."

"And knowing that, and knowing that they are of a high order of intelligence, I ask again: Why did they fight?"

"Could it have been sheer desperation?"

"There was calculated strategy in their battle plan. There was a purpose, I tell you. It is obscure to me, but there was a definite plan, and no plan is executed without a purpose."

"Could they have hoped to hold us off?"

"Never. They knew our strength. They knew our plan. They understood our purpose, and they recog-

nized our determination. Does the weakling, knowing all factors, fight against his superior?"

"It might have been the determination—knowing they must lose—to take as many enemies with them as possible."

"The cornered rat technique?"

"It has been done before," observed Vorgan.

Lindoo agreed. "You were not there," he told the Lord of All. "Their plan bore the stamp of a superior strategist who had some purpose in mind. A purpose that required him to fight a losing battle for other reasons than the cornered rat technique. You see, Vorgan, the cornered rat technique presents a rather peculiar psychological problem. It is a suicide-fighter's psychology. And suicide fighters operate in a vastly different manner than a man who is fighting for something beyond the abstract concepts of a victory for his contemporaries and his descendants. Even the most vicious and well-trained of suicide fighters is inferior to a reasonably well trained man wrested from his home and impressed for service. The psychology of the suicide fighter evolves into a seeking-for-death technique, which lessens his survival factor over a man fighting to preserve his integrity and fighting to get the battle over with so that he can go home and resume his daily life. We know that. That is why the Loard-vogh fighter is supreme. He is no suicide fighter. He is vicious because he has been wrested from his home and family, and his tenure of

service depends upon his ability. Since a victorious soldier is mustered out of arms and sent home sooner than a lax one, it urges all men to perform great deeds, act in a superior manner, and to be victorious in the shortest time so that he may return to his daily life. The Terrans are far from suicide fighters, Lord of All. Their theories of warfare are similar to ours. In fact," smiled Lindoo thoughtfully, "every race that offers us a stiff resistance seems to have come to that conclusion."

"Then what was their purpose? Seems to me that they must have been fighting for something."

"I don't know. They will fight if outnumbered, of course. The entire Solar Sector is composed of forms of life with a bitterly high value of survival factor. That, coupled with high intelligence, should indicate that surrender offers the greater number of survivals."

"Perhaps you do not understand their psychology."

Lindoo admitted this. "I have with me their mental leader—the former susceptible Billy Thompson. Perhaps we may get some idea by questioning him."

"Have him brought in," agreed Vorgan.

He pressed a button.

A crack opened in the ceiling, and down from above there dropped a reflection-free sheet of perfect glass. It slid in fitted slides, and sealed off the room into two sections.

The section occupied by Lindoo and his emperor was large and roomy, but the other section was small, a sort of cove, off of the main room. A man-at-arms moved an ornate chair that stopped the descent of the glass, and when the sheet of glass reached the floor, men-at-arms went around the edges and sealed it with a gluey mixture that came from portable pressure-guns. This was done on both sides, and as those on the small side left the room through the tiny square door, one of them snapped a button on the wall. The invisible and soundless atomizer-vents in the ceiling filled the air with a gentle spray of the best bactericide known to the Loard-vogh.

The tiny door opened again, and Billy Thompson entered, leaving his glass case attached to the door frame on the other side.

His nose wrinkled at the smell of the bactericide, but he grinned at the precautions. He, the vanquished, still held sway over their fears.

Thompson advanced and saluted. Then he waited.

"Arrogant, to boot," snapped Vorgan to Lindoo. His voice came to Billy out of the speaker in the ceiling, and Thompson stifled the natural impulse to face the position from which came the voice. He faced Vorgan.

"Not arrogant," he said quietly. "I merely request the respect shown to a vanquished, but adequate adversary."

"Our adversaries are always vanquished," snapped Lindoo. "And they become our slaves."

"A slave you may consider me," nodded Billy. "That I can not change. But the self-respect I have for having been vanquished only after a bitter fight requires me to consider myself more than a voiceless slave. You can not change that."

Vorgan looked at Lindoo. "Was that your reason for fighting?" asked the Lord of All.

"The basic reason for all strife," said Billy, "is to impose your will upon your adversaries."

Vorgan and Lindoo nodded impatiently.

"We fought to impose our will upon you. Our will is that we of the Solar Sector gain your respect, slaves though we must be."

"And you were willing to lose eight and one half million men to gain that respect?"

"Your estimate is wrong. We lost but seven thousand souls—five thousand of which were civilians caught in the backwash and splash-over from our fighting."

"Seven thous—" exploded Vorgan, visibly shaken.

"Seventeen million—" cried Lindoo hoarsely.

"Your losses?" asked Billy of Lindoo.

The Head of Strategy nodded.

"It is deplorable. I am sorry—"

"How dare you!" thundered Vorgan. "How dare you, a slave, to feel sorry for your masters?"

Thompson smiled wanly. "Would I get better treatment if I claimed to be glad of your losses?"

"I'll have your throat—"

"Careful, Lord of All, you are not being fair. I am damned for being sorry and equally damned if I feel glad. Do you prefer my sympathy or my hatred?"

"You brazen, arrogant—"

"Vorgan, I and all of the Solar Sector are at your mercy. We fought you to prove our ability, and to gain your respect. Had we surrendered without a fight, we would have gained your contempt. Also," smiled Thompson, "it is foreign to our psychology to give up easily. But the main reason for fighting was to extract from you a modicum of respect. That we have done."

"You assume—"

"I know. You are puzzled by my temerity, amused by my position, and completely baffled by my purpose. Were it not so, I would be dead instead of here, behind this protecting glass. For otherwise you wouldn't bother with a race so dangerous to your very lives. Am I correct?"

"Assume so. And proceed."

"The thing that makes us dangerous to you is the same thing that will make us useful to you."

"A moment. At this point I can wait no longer," said Lindoo. "Before this bold Terran leads us too far from the subject, I must know: How did you preserve your forces in that bitter fighting where your ships fell like hail?"

"We ran out of ships, not men," smiled Thompson. "We adapted a phase of the snatcher beam to personnel-protection. Each man carried a focal attractor in his clothing. Ship-destruction triggered a

fast time-constant multi-driver circuit that inclosed each man in the incompressible spheres of the atomic crusher principle. They were withdrawn from the stricken ship while it was still exploding and brought back safely to a redistributing station where they re-entered the battle in a new ship."

"We'll make a note of that," rumbled Vorgan. Lindoo looked a bit ashamed of himself for not having thought of it before.

"Now, Terran," said Lindoo, "there was talk of a secret weapon. What was it and why was it not used?"

"As a means of destruction," explained Thompson, "nothing of that nature exists. Terra's secret weapon in this case lies within your own minds. We were fighting for survival, and the retention of our integrity. Our secret weapon is the respect we extracted from you in fighting valiantly and losing necessarily. Our secret weapon is our minds and our ability to employ logic and data to a problem and come up with an answer. The personnel snatcher is but one phase of this weapon we possess. You admire it. It is, of course, yours by right of conquest. Other developments will be yours, also. But they would be lost if we had been merely trampled over and our interesting facets ignored by the high councils of the Loard-vogh. You have a horde of problems, Lord of All. A myriad of problems that we of Terra may solve. I offer you the Solar Sector as a research area!"

"You offer?" asked Vorgan, puzzled. "You infer that we have not taken?"

"Permit us our integrity. Sol is our home. Sol is unfit for you, and Terrans are not well liked in your empire because of the living death we carry. Permit us to remain in the Solar Sector and we will be your research area."

"And free to breed discontent?" asked Lindoo.

"Are we fools? Our battle was to impress you with our ability to be recognized as worthy. Another fight would prove our lack of intellectual grasp of the truth. Permit us to live as we were, and you will have all of the benefits of our rather harsh environment to aid you in your plan. Were you of another psychology, I'd offer alliance, but being what you are I can but offer allegiance."

"Offers!" scorned Vorgan impatiently. "We demand."

"You cannot force mental activity," reminded Thompson. "You can drive a slave to fetch and carry, to become agricultural, to be menial. But you can never drive a man into mental activity. The subconscious mind will block. The subconscious mind will divert, and will work against those who drive, and the result will be complete loss of Sol's children and the benefits of a violent heredity. Permit us to remain as we are. Put overseers there, communications offices. We will solve your problems."

Lindoo whispered to Vorgan for a moment. The Lord of All

snapped off the communicator, and he and the Head of Strategy spoke for an hour while Billy waited in silence, wondering what they had in mind. Finally Vorgan turned the communicator on again and said:

"Terran, if what you say is true, you are correct in your assumption that Sol will be of value as she is. I offer you a chance to prove it. Sscantoo is against all forms of alliance. Sscantoo will ally herself with any other race temporarily to fight us. The entire Galaxy may spring against us if Sscantoo can not be subdued. We must attack Sscantoo in the due course of time.

"There is one difficulty, however. The Sscantovians are not a gregarious race. Eventually we shall have the same trouble with Sscantoo as we have had with Tlembo. The catmen will seek a worthy adversary, and cause us to attack some sector long before our plan calls for it. Your premature battle was but one in several caused by Tlembo, all of which bring the Loard-vogh out of line and off balance like a runner careening downhill. Numberless though we may seem, we cannot overrun the Galaxy until our numbers permit it. It must be taken slowly and with definite pattern.

"Now, Terran, we can wait one year before we hit Sscantoo. I'll give you that one year, Terran. In that year, you must devise a means of gathering Sscantoo into the Loard-vogh empire. It must be done without battle. It must be done without losing a man—no, that is expecting too much," smiled the Lord of All nastily, "it must be done without losing more than one hundred men! That does not include Sscantovians, of course."

"Within one year," said Billy Thompson, "we will hand you Sscantoo as a willing part of the Loard-vogh empire. It will be done without battle, without losing more than one hundred men in the process. What will happen to the Sscantovians I will not presume to care, but I shall destroy as few as possible. During that year, of course, we will be free to work?"

"I will countermand the order displacing all Solar Persons save a small percentage willing to act as data clerks and research coordinators," said Vorgan. "That is my will."

"You will be more than amply repaid," said Thompson. "And one research we will make to provide the Galaxy with adequate protection against visiting Terrans, and protection for those visiting the Solar Sector. That, too, is a promise."

Within an hour, Thompson was on his way back to Terra. A year, he had. And four months would be gone ere he landed on Terra, and another long period of time would pass before he could get to Sscantoo. All in all, Billy felt that he had too little time.

Yet he smiled. For even in defeat, Terra would not lose her integrity. And how bad is slavery when the master prefixes his request with "Please"?

XVIII.

Billy Thompson fretted for four long months in the confines of the returning spacecraft. He was not idle. Daily he spent his time in the communications room, talking and conferring with his laboratory staff on Terra.

The order freeing the Solar Sector of its displacement of peoples took about ten days to clear, and another ten days to settle. It was swift; no Loard-vogh wanted to remain in that section of the Galaxy anyway. And though most of the worlds were cleaning up the shambles of the bitter struggle, the laboratory staff and research organizations went to work with a will. Let the others clean up the mess; it was their job to make the cleaning worth while by coming up with the answer to Billy's problem.

For only the right answer would leave Terrans around to inhabit a cleaned-up Terra.

So Billy fretted because he had to confer by voice alone. It did not matter that the secondary radiation from his subtransmitter, exciting bands in the electromagnetic spectrum near forty megacycles, would not reach Sol for hundreds of years, and that relative to his ship, the beams were hurled out backwards instead of coming forward toward Sol. But the four months were not entirely wasted. By the time that Billy landed, conferred with Kennebec on the future, discussed the major problem with a few Terran scientists, and then took off and finally arrived at the stellar laboratory on VanMaanen's Star's only, God-forsaken planet, they knew several hundred things that would not work.

Hendricks, the chief of staff, smiled wearily as Billy entered the safety dome and flipped back his space helmet.

"Hi, Billy. I hope you have a few new ideas."

"Nope. Not right now. I've been busier than the devil for the past seventy hours."

"So've we, on the last seventeen suggestions. We ran out of ideas when you ran into Terra. Now what?"

Billy grinned. "I'd like to see the quake area."

Hendricks blinked, blanched briefly, and then smiled wanly. "I thought so. Nothing to see, though. We do have a slow-action movie of the debacle. Reminds me of something out of a superthriller, shot in miniature. We had the sphere beam set up in duplex, one taking power out of the star, supplying the other beam which was clutching about five thousand miles of the star's core. The projectors were anchored to the crust of Brimstone, here, and we started pulling. We pulled like a dentist working on an impacted wisdom tooth. Unlike the dentist, the tooth stayed. We broke several beams, each one doing a bit of crust-cracking when the pressure let up. Then we took a big bite and heaved for all we were worth. A slab of crust about seven miles square heaved up, tilted like a poorly-trimmed raft in a heavy sea, and slid sidewise into the semi-

plastic inner core of Brimstone."

"I'll bet it was bad, huh?"

"We all got away. The planet heaved and gurgled for a week before it settled down. But Brimstone is less strained than Terra and aside from a few scattered quakes now and then, she's quiet. Made a mess of that district, though. Horrible roaring, clouds of boiling steam, and all the trimmings out of a 'Birth of Terra' animated moving picture."

"Try it with an anchor set in the planet's core?"

"Yeah, but that's too much like anchoring a towline in a cup of custard. Too plastic. We might do it if stars weren't so confounded far apart. Beams get awfully thin on that projection even if we could make it, which I doubt."

"And if we could," said Billy, "we'd have to wait a few years while the beams got to our stars. They propagate at the speed of light, you know."

"Wonder if we could drop a beam from close by, go into superdrive and race for the other star, stretching—"

"What causes the traction?"

"The . . . ah . . . I see what you mean. It's the fact that the beam itself is ponderable and unyielding. Superdrive or no, the beam would propagate at speed of light and the superdriven ship would either be held back or the beam would break because of the space between excitation pulses. O.K., Billy, how do we jerk a hunk out of a star core?"

"We can't do the Samson Trick," said Billy, "but—"

"Samson Trick?"

"Samson was supposed to have brought the temple down about his ears by taking two of the main pillars and pulling one against the other. Well, we can't pull one star core against another, but why can't we set up a tripod, anchored in the stellar core, and then use that as a base for hauling with another beam? And feed power for the gadget from other stellar intake beams right from the star itself."

"In other words a sort of reflex Samson Trick? You make the star pull itself apart, with the aid of mankind and a few thousand years of technical development. I'll have the boys get to work."

"Did you get any compression?"

Hendricks shook his head.

"That was a vain hope. The stellar core is under hard compression already. O.K., Jim. Oh, Hello, Cliff."

"Hi, Billy. So you sold them a bill of goods?"

"Unless we get results, Lane, it'll be a bill of goods. If we come through, we're not bad off. Where's your sidekick?"

"Stellor? He'll be along directly. But look, Billy, what do you intend to do with this dingcrank when you get it working? Tear the guts out of the Sscantovian System?"

"Nope. Just insurance."

"We'll need it," grinned Lane. "You cut out a large hunk of selling when you ask Linzete and his gang of rugged, predatory individ-

ualists to form an alliance with the Loard-vogh."

"Trouble is that 'alliance' isn't the right word. I'm offering the grand and glorious opportunity of becoming willing subjects to the Loard-vogh."

"Huh. Never was a cat that took to being ordered around. Gosh, they're worse than we are. We'll take orders if it will do us any good. But Sscantovians? *Phoooo.*"

"Well," said Billy, "when a lion tamer enters a cage full of cats he gets results. But most of them are well equipped with a revolver, a whip, and a four-legged stool. I'll walk in easily, tell the catmen to be nice, and wave my whip. But the whip has got to be loaded. Linzete wouldn't fall for a bluff. Cats don't. You've got to show 'em the

stuff, and then you get your answer. Well, we've a couple of other things to try."

"We aren't licked yet," nodded Lane cheerfully. "But look, Billy, I'm still befuddled by Downing's stinking slow, methodical way of doing things. As I get it, Toralen Ki and Hotang Lu told us that we'd all be increased in mental stature after the Transformation."

"Sure. We are."

"I don't notice anything."

Thompson grinned. "You won't. You never will. No Terran ever will. We'll all go on just the same as we were, apparently. It is a Terran characteristic that a personal change always seems to be an opposite change in the rest. We'll all go on as we are and the rest of the Galaxy will appear to get stupider. The change is and has been—and will continue—to be gradual enough so that you will believe that you've always been possessed of a near-perfect memory. But play chess with your pals, and you find that you are still even because the other guy can lay just as complicated traps as you can with your increased ability to reason. But you see, it is like that old analogy. If the entire Galaxy and everything in it were increased by one hundred times, you would not be able to detect the change. That's because your yardstick changes, too."

"Relativity, speaking," grinned Lane.

"Classification: Pune. Definition: Pun that needs an oxygen tent. Or better, the perpetrator a half-hour immersion in liquid helium." He looked around and saw Stellor Downing, leaning against the door with a half-amused expression on his face. "Hello, Stellor."

"Howdedo. A nice job of selling you did on Vorgan."

"Yeah, and a nice pinch he put me in."

"Maybe you shouldn't have niggled him so far."

"I was a little rough on him," agreed Billy. "But I pushed him right to the limit of my safety. I applied all the traffic will bear. I had to, to show my boldness and to intrigue his fancy, since I knew that in all their victorious twenty thousand years of conquest they had never hit a race that stood up and told him off, face to face."

"You knew what you were doing, as usual," admitted Downing. "But I came to tell you that Hendricks has the tripod beam and the associated junk is set up and ready for the job of jerking the guts out of VanMaanen's Star."

It was not too impressive on the surface. Brimstone was cold and forbidding and airless, the only planet to the runaway star known as VanMaanen's Star. A useless system save for experiments of this nature, but excellently adapted for such.

The solar intake beams were operating efficiently. The torrents of power they would drag out of the star and use to develop the unthinkable pressures necessary to

move the core of the star would come into the acceptor tubes. Foot-thick superconductors connected the intake beams to those to be used for the tearing process. And these superconductors were maintained at the temperature of liquid helium by a liquid-cooling system. Liquid helium needed no circulation, since its heat-conducting properties were such that no local heating in a bath of liquid helium is possible. Normal evaporation from the open bath at one side kept the system cold, all the way through to the superconductors.

"Good thing they don't have to use switches or breakers, otherwise I don't know how they'd handle the energy," said Lane. "A sort of grid-controlled intake—swell stuff. Well, fellers, let's get in the control room and see what gives."

Hendricks handed Billy a small chromium-plated case the size of a cigarette pack.

"We're putting personnel snatchers on all of us. If this blows—in fact if the whole planet blows, we all end up a couple of thousand miles in space, all canned up in incompressible spheres. Safety first, I say."

"That's how you saved the gang in the earthquake experiment, isn't it?"

"Uh-huh," admitted Hendricks.

"Well, let's take off. We've got everything nailed down tight."

Hendricks advanced the power. The meters read up, and the anchoring tractors moved slightly in their gimbals and became immobile. The projectors forming the tripod of inflexible beams took up all the remaining slack in the beam system. Not one piece of unprotected matter was left to form a weak link. Beams of sheer energy, efficient to within a fraction of a percent of the ideal one hundred percent, linked the beams invisibly. A system of inflexible energy, driven and maintained by the energy output of a star—driven to rip the core out of the star itself.

The beams thickened as the automatic control advanced in timed steps. Evaporation from the lake of liquid helium increased as the superconductors warmed slightly from the terrible load.

A wrenching—*feeling*—came to them.

A meter indicated that one of the beams—the sphere beam clutching a five thousand mile sphere of stellar center—indicated a movement of point one seven four inches.

The automatic controller went up another stepless interval, and the wrenched—*feeling*—increased.

Through the viewport, the small flaming disk of VanMaanen's Star blazed at them. It looked as though it were quite ignorant of the cosmic forces that were tearing at its vitals. There was an air of saucy disregard in its placid, immobile brightness.

The pressure increased.

"At this point we jerked up a slab of Brimstone's hard crust," remarked Hendricks.

But Brimstone was not in the link. Brimstone was not even present. The inflexible tripod of energy

would scorn to move with the planet. The control room and the main development housing connected to the high base of the projector network were depending upon the invisible tripod of energy, deep in space. Brimstone was a large moon, a gibbous last quarter, out through one side window.

The automatic control went higher. And as the pressure increased between the limbs of the tripod, even so increased the power intake from the star itself.

Did a star have within it enough energy to cause its own destruction?

They did not find out.

The *feeling* of a wrenching increased, and then leaped into full being. Nausea, sheer instantaneous torture, a pulsed wave of pain, a shattering sensation of intolerable noise, a blinding light that came though the eyes were closed.

But these things were merely the physical and mental effects caused by—

By what?

There had been no grinding crash. There had been no failure of the beams.

Yet the meters read zero. Both intake and output. Test power and operation perfect registered on the string of indicators.

Nothing wrong—

—but the flaming disk of Van-Maanen's Star was gone.

Something had failed, but it hadn't been the equipment.

Something had failed, but it hadn't been the star.

And the station and the control room was drifting aimlessly in space. Inspection showed that no star was close enough to be Van-Maanen's Star. There were no stars within a couple of light-years from them. Above their heads, the projectors were idling in their slack gimbals, the tie-beams were off. The solar intake beams were taking in no power. The lake of helium, a twenty-foot open bath on the roof of the housing, was lying quiescent.

The entire assembly and assemblage was as it had been before the initial surge of power, excepting that Brimstone and his bright primary were nowhere to be seen.

XIX.

"Well, what happened?" asked Lane.

"You tell me," Downing said.

"Obviously something gave — but quick," remarked Billy. "The question is: What could give?"

"The star didn't. We weren't on the planet. Whatever gave—we are a long way from where we started, at any rate." Hendricks scratched his head in puzzlement. "You don't suppose we have gone and warped ourselves right out of space, do you?"

"That sounds like a comic book plot. I'm not taking any odds-on bets, though. Have you got an air condenser and a resistance-capacity bridge? Not the kind that compares a standard condenser against the unknown in terms of the resistance ratio arms, but one of the cheap varieties that merely compares the resistance ratio arms

against the ratio of resistance versus capacitive reactance."

"Uh-huh."

"Is it calibrated to within an inch of its eyebrows?"

"Yup."

"Well, the dielectric constant of space is calculable. Measure up your air condenser and see if it comes out even. Get the boys to measure the radiation resistance of this space. It should be three hundred and seventy-seven ohms. That is—if we are still in our original space. Also you might get the standing wave ratio on some of the microwave transmission lines. They depend upon the characteristic impedances of space, the permeability and dielectric constant."

"O.K.," smiled Hendricks.

"Why the smile, Jim?"

"I was merely recalling a story like this. The hero proved it by determining that Planck's Constant was not the same as back at home. I was wondering how we'd measure it."

"How did they do it?"

"They didn't say."

"Good thing. Well, I like my method better. By measuring the capacity of an air dielectric condenser, the dielectric constant of space will be evident—but only if it is measured on the resistance type of bridge. Comparing it to a standard condenser would result in both of them shifting at the same time. Whereas the resistance of a metal wouldn't change. That does not depend upon the vector analysis factors of space, whereas capacitive reactance does."

"We might measure the speed of light, too."

"Not until we get this barge to a planet so we can get a decent base line."

"We're not ill-equipped as all that," objected Hendricks. "This barge, as you call it, is fully equipped with drivers."

"Why didn't the snatchers work when we took out after the devil?" asked Lane.

"Nothing blew, in the first place," said Thompson. "And in the second place, if we've warped ourselves out of our original space, the snatchers might have had a tough time focusing on something heading out of space through a warp in the continuum."

"Spectral lines do not mean anything in particular," said Downing, who had been peering through a solar spectrometer at some of the nearer stars. "More proof."

"Well, sure. Among items like having a different set of elements and physical laws, the impedance of space is all tied up in the speed of light, wave length, is a function of that, and so forth. Show me one item lying in the field pertaining to the angular vector-pattern of this space that agrees with that back home and the rest will probably match too, and we'll be back home but displaced by God-knows-what."

"Ralph Welles claims that the radiation resistance of space is about two hundred and seventeen ohms," reported Hendricks. "And Al Forbes reports that the dielectric constant of space here is about

twenty micromicrofarads per meter less than back home. And the boys in the microwave group claim that the quarterwave stubs in their pet transmission line demand a new fundamental frequency of operation. O.K., fellows. We started to bust up a sun and busted ourselves right out of space and into another. Well, let's find a nice solid planet somewhere and get there so we have solar power. Then we can start thinking of ways to get back."

"So we couldn't pull the insides out of a sun, even using the sun's own stellar atom factory for power," smiled Thompson, "but we did manage to pull ourselves right out of space. Sort of a case of the sun pulling first, I guess."

"Yeah," agreed Lane plaintively. "But how many different spaces are there in the cosmos?"

"Probably an infinite number infinitesimally separated," answered Downing.

"In which case," returned Lane, "how many spaces did we skip between back home and right here?"

"I doubt that the separation between different space continuums is infinitesimally small," objected Hendricks. "More like a matter of a sort of quanta-separation. If the separation were not reasonably large, the energy necessary to break through would not be so great. I predict that we are in the space next door to our own."

"And if we take hold of another sun and pull—do we go one more space away or back again?"

"I dunno. There isn't a space-theorist among us. I'll tell you one thing, though. By the time we pull ourselves back and forth a few times, we'll know which valve to hold down in order to drive up instead of down."

Billy nodded. "If, as, and when we get back, let's see if we can devise a method of tilting a hunk of stellar center into this space from there. Better, probably, than just jerking it loose."

"Far better," observed Hendricks dryly. "If we can tilt ourselves into a new space whilst pulling on a stellar core, obviously it is easier to warp something into a new space than it is to rip the innards out of a star."

"Is this the point to suggest that we have a brand new galaxy to work on?" suggested Downing.

"Nope. We'll tell the Loardvogh about it, though, and they may decide to do something about it."

Perhaps never before has a stranger object traversed interstellar space. Not by a stretch of the imagination could any race have designed a spacecraft resembling the squat housing adorned above with the battery of projectors. In the first place, it was all wrong for spacecraft design, being built to sit flat on a planet where the normal gravitic urge was down—or rather normal to the flat bottom. Spacecraft are tall, ovoid shells that travel vertically, parallel to their long axis, and the decking extends from side to side, at right angles to the ship's course. And the projectors should not be all on one side. That would leave the strange craft at the mercy

of an attacking enemy from below. Spacecraft armaments consist of one turret in the top, or nose, one similar turret below, and several at discrete intervals about the center of the ship for side protection.

Of infinitely more trouble than the problem of traversing space in superdrive with an engineering project instead of a spacecraft was the decision of which way to go.

Being lost in the depths of interstellar space without a star map and with no idea of their position, and no one to call for a "fix," there was no way of determining which of the stars were the closer. They all stood there, twinkling against their background of stellar curtain, and one looked as close as the next. Brightness was no criterion. Deneb, four hundred light-years from Terra is brighter than Alpha Centaurus, four light-years away.

Yet, with superdrive, they could cross quite a bit of space in a short time. Hitting it off in any direction might bring them to within deciding distance of a star in a short time or it might be that the course went between stars for many hundred light-years.

It was Hendricks who solved the problem. "Get a hemisphere picture—and we'll superdrive for one hour and take another. Superimposing them one a-top the other should give us a reasonable parallax on the nearer stars. One that we could see with the naked eye."

With the fates obviously laughing up their sleeves, the second plate was never exposed. At fifty-one minutes of superdrive, the stellar detector indicated stellar radiation within one quarter light-year.

Planet-locating plates were exposed as the project swept through the star's neighborhood. There was quite an argument as to which of the seven planets to choose, and for no other reason than sentimental reasons—and the fact that the physical constants were right for them—the group finally fixed their desire on the third planet.

The engineering project started to head for Planet III.

"Better name it, Billy," smiled Hendricks. "You found it."

"I found it? O.K.," grinned Thompson, "we'll call it Eureka."

"Eureka III?"

"Too cumbersome. Since we'll possibly not chart the system let's just call the planet Eureka and forget about the stellar classification."

"Well, Eureka it is."

Jack Rhodes opened the door. "Better call it Money," he suggested.

"Why?"

"Because you fellows are going to find out that it is the hardest thing you've ever tried to hold."

"Huh?" asked Hendricks.

"We're right close and there isn't the faintest shred of gravitic field."

"Oh, no. Newton's Law—"

"Is valid right up to the last decimal place. 'Every object in the universe attracts—' and we just ain't a part of this universe."

"Doesn't seem right."

"May be of exceptionally low density."

"Must be zero, then," grinned

Rhodes. "And if so, how does it hold itself together?"

"You answer that—it's your question."

"How long before landing?" asked Hendricks.

"Half hour. Look, chief, d'ye suppose we might find it to be contraterrene matter?"

"Um. What do you think, Billy?"

"If the matter here is the same as the matter back home, we'd have a fifty-fifty chance of it being contraterrene. It might even be something that was neither terrene or contraterrene for all we know."

"Interesting possibility. You mean something that is neutrally charged so far as we're concerned, but which in this universe consists of oppositely charged items?"

Billy nodded. "We'll find out."

"It has atmosphere, and the test

shell didn't result in a contraterrene indication," called the pilot of the project."

"An atmosphere of what?"

Rhodes grinned. "God-knows-what," he said. "If Stellor can't make head nor tail out of the spectrograph, the chances are that the atomic stuff here might not jibe with ours at all."

"There is really no reason for our planeting at all," said Billy. "But I'm just curious, that's all."

"We'll be there soon."

The project approached the planet, and was forced to drive all the way. By the time that they had matched the angular velocity of the planet's rotation, the project was inverted with respect to the surface—though to the men it seemed as if they were driving *up* to a ground-surface. It gave them an eerie feeling.

"I can see myself visiting a psychiatrist by the time we get back," grunted Hendricks. "We're landing—*upward*—and I'm getting the screaming terrors already from that feeling of falling upward into the sky."

"What you're suffering from is the shattering of your basic faith in the solidity of solid ground," remarked Billy. "Well, the project will land upside down, and we'll take hold tight with the anchor-projectors. Long enough, at least, to scrape a sample off of Eureka, here, to take back and analyze."

"If this whole space is made of the same stuff, I can see a minor industry springing up, gathering metal and stuff for gravity-proof gadgets."

"Wonder—probably good for something. Well, we're as close as we can go, all of us standing with our heads pointing at the planet and held to the floor of our project by centrifugal force caused by the planet's rotation. We won't stay long. None of us can stand the mental strain of looking out of the window and seeing solid ground a few feet above our heads and a million million miles of sky to fall down into if we step out of the door. *Brrrrr.*"

"Close the sun proof shutters and don't look," suggested Billy. "I'm taking a nice large bromide to chill off a few screaming nerves and then I am going out and take me a shovelful of that dirt and rock up there. Gosh, it's going to feel funny digging *down* something that wants to rise. Let's make it quick."

Billy emerged from the lock completely clad in spacesuit. He took air samples, and then, with the catch-knob between his shoulder blades firmly in the focal sphere of a tractor-pressor beam, Billy was shoved up to the surface of the planet. Reaching up over his head, Billy pulled down a few stones and dropped them upward into the bucket he held inverted. They fell upward to the surface of the planet, and the bucket was held by their weight.

They never did know whether there were any Eurekans, but if there were, and the Terrans were watched, it was a strange sight they saw. A sixty-foot rectangular

building of steel, one story high, resting upside down with the planet-side to the sky. Projectors dug into the ground, pulled by the anchoring tractors that pulled the upside-down building even tighter to their planet.

From a spacedoor, a pale green beam was fastened to the knob on the creature's back. He was head down, suspended on the beam, and carrying a bucket that must have been filled with antigravity material for the bail was free and the bucket actually hung upward!

The creature was lowered, still head down, to the surface of Eureka. He reached down below his head and lifted a few stones, dropping them into the bucket, which he held right-side up. Naturally the bucket dropped properly enough to the ground.

Working by digging down, Billy filled the bucket and was returned down to the door.

"Cut 'em!" he said hoarsely.

They cut the anchors and the project was thrown from the surface of Eureka by centrifugal force. And as they left Eureka, and headed for the Sun, they held a council and decided that another attempt —blind though it would be—to warp space would be in order.

XX.

"Get every recording gadget we've got on the thing," said Billy. "Maybe we can find out something that will give us a directional trend. And anybody who thinks he won't be struck by lightning if he makes a prayer, go to it. We could use a bit of Divine Assistance."

The detectors were set up and the recorders started. The tripod of anchors set themselves in the star's core. The solar intake beams worked well and the torrents of power increased as the automatic control slid up the scale.

"The stuff may be different," observed Hendricks, "but we can still get power from their stars."

"Darned good thing, too," said Thompson. "I don't know how else we'd swing it."

Again came that feeling of wrenching. And it increased as before.

"Does it feel left-handed or right-handed?" asked Lane nervously.

"I don't know and if I did I wouldn't remember which way it was the last time," grumbled Downing.

And then the warp formed, and there was the impression, just before it snapped-quick, that the stars in that universe were flowing like spots on a watery surface.

And they emerged into a space completely devoid of anything. Not a star, not a speckle in the complete sphere of utter blackness.

"Obviously went the other way again," grunted Lane.

Jack Rhodes looked up from his calculations. "We had a fifty-fifty chance, according to the Law of Probabilities. But tossing one head does not make the next toss any better than fifty-fifty chance for tails. In fact," mused Rhodes, "tossing a hundred coins may bring you forty heads and sixty tails—

plus or minus ten percent of the true chance. Tossing a thousand coins may give you four hundred seventy against five hundred thirty—a three percent error. But though the latter is more to the true division, the numerical deviation from zero is only ten in the first case but thirty in the second."

"I hate mathematicians," grumed Downing. "They're all pessimists. So the longer we try the more distant we get, huh?"

"Unless we can get something to upset the Law of Probability."

"And," added Hendricks sourly, "something to pull against. This universe is completely devoid of anything material."

"Let's put that as a matter of our being able to detect it at present. It might be teeming with suns indigenous to this universe and completely invisible to us."

"We're wasting time," said Thompson. "What's with the detectors and recorders?"

"About the only thing I can determine from here is a definite lengthening of the wave length that the puller-sphere propagates on."

"Huh?" asked Billy.

"Definitely."

"When did it lengthen?"

"Its wave length increased on an exponential curve to the time of warp—"

"Well, now we know—I think—how to get back."

"How?"

"Instead of pulling, we'll push."

Hendricks shook his head. "I think I get you, but I'm not too certain. Has to do with the wave length-propagation factor, hasn't it?"

"Sure," grinned Billy. "For a given frequency, and a given velocity of propagation, there will be only one possible wave length to suit the conditions. That, essentially means that a given distance will have a definite number of wave lengths so long as the frequency and speed of propagation is maintained. The puller-sphere we were using is propagated on a tractor beam. The characteristics of a tractor beam are that once established, the number of wave lengths between projector and object remain the same. Then the projector presents a leading signal phase, and the phase of the tractor beam moves toward the projector to bring the two waves into zero phase difference. The projector maintains the leading phase all the time, and thus draws the object. It is just like turning a nut on a threaded rod, sort of. The wave length is analogous to the distance between the threads, and the frequency is the number of threads that pass a point when the rod is moved at the velocity of propagation.

"Now, suppose we consider the threaded rod as being fixed at the far end, and pulling at the projector end with sufficient power to stretch the rod. The frequency happens to be definitely fixed by the primary standard in the control rack. The distance between remains the same by the constants set up in the tripod and puller beams. The wave length-

factor, striving to satisfy the demands of the tractor beam, and maintain the correct number of wave lengths as the beam pulls, will cause the wave length to lengthen. But that tends to change the frequency-velocity factors. Result, if I'm getting obscure again, return to the thread analogy. A standard ten thirty-two screw has thirty-two threads per inch. Stretch it evenly, and disregard the distortion, and you have, say twenty-four threads per inch. Our pulling against the sun resulted in a distortion of the wave length-frequency-velocity factor, and we pull ourselves into the next notch in space that fits the increased wave length-frequency-velocity argument.

"So," concluded Billy, "by pushing instead of pulling, we can cram the wave length down again, and warp space in the other direction. Think?"

"I'll buy it—if you can find something to push against," said Hendricks.

"Shucks," grinned Billy. "Shove out your tripod a short distance, but focus them all together. Then shove against that field of focus."

"Said is as good as done," said Hendricks. "Better work, too. Right now it is raining gold coins and we're wearing a pair of boxing gloves."

"And while we're on the way back—I hope—we might consider this: Suppose we take two tractors and face them at one another, hold 'em apart with a trio of pressors, and let the thing go to work. That's providing that we find any use for this subspace stuff. It might—"

The wrenching took place at that point. It was much as before; as far as physical evidence went there was no means of telling whether this again was "up" or "down." There was apparently no drift between universes, for their subspace star was not far away.

"This might not be too good," said Billy nervously. "What happens if we land in the middle of a star?"

"We have a far better chance of landing in the royal middle of intergalactic space," observed Hendricks. "We may have been in that position in the sub-subspace. Well, Billy, it is obvious that you hit the right answer. Shall we take hold of Eureka's sun there and shove?"

"Why bother. Let's be independent."

Rhodes nodded. "The thing is still set up."

"Well, give it the works."

The space warp started again, and again the project was wrenched through the barrier.

"VanMaanen's Star must be that one back there," observed Hendricks. "Hard to say, but we hit it up about that far to get to Eureka."

Rhodes looked up from the subradio. "That's them," he said. "And they want to know how in the name of the seven devils we got out here so far in such a short time."

"Short time? Nonsense. They flew in subspace for an hour, it

took us a half hour to land on Eureka, and Billy spent another half hour digging pay-dirt. After which we raced off for, say a half hour or maybe an hour before we went into space two. Our stay in space two was about fifteen minutes, and the passage through space one was made in less than a minute. Call it a total of three hours."

Rhodes checked his chronometer. "We've been gone about three hours," he said into the set. The answer came back immediately, for all to hear. "Like the devil. You've been fifteen minutes since you fastened on to the star and were jerked off of VMS I."

"What's your nav-chronometer say?" asked Billy.

"Seventeen-forty-three."

"And we left the scene about seventeen twenty-eight?"

"Approximately."

"Well, chew this over. Our nav-chron says twenty fifty-one."

"Snap on the differential timer," suggested Hendricks.

Microsecond pulse signals crossed space, both ways. The timer started counting. Three hours and twenty-three minutes and eleven seconds went by before the timers stopped. There Hendricks and Thompson went into another conference.

"We have the following observations regarding subspace: One is that the matter is unlike Terrene matter. The other is that there is a differential in time passage. The latter may be quite useful. We'll have the gang check everything possible, of course, and probably even set up a laboratory in the lower spaces. This lack of gravity—has me stopped cold," said Hendricks.

"Excepting for the observation that Newton's Law mentioned every particle in the universe—"

"I don't think Newton was trying to be snobbily semantic," laughed Hendricks. "Besides, his Law is a translation from the Latin, and at that time they weren't even sure of space, let alone subspace and space two, et cetera."

"I've always wondered about the conservation of energy and the problem of how gravitic attraction couples into that. It could be, of course, that the universal attraction comes from the fact that all the universe was once a single body that exploded because of its own mass-warp. Energy driving the mass apart during the formation of the universe—which is still expanding—and because it took work to separate one body from another, the conservation of energy dictates that they undo that work to get them back together. Since our project was not a part of subspace, no expanding work had been done on it, and therefore no potential energy had been stored which would be released by gravity taking place."

Hendricks smiled. "It's as good a theory as the next," he said. "But is it solving the Sscantovian problem?"

"No, but I have an idea that may. We can set up our warping beam and transfer the resultant forces in the same manner as we transmit other energy. We can't jerk the insides out of a star, nor can we compress the matter there.

But there is nothing that says that we cannot change the physical constants prevailing in a certain sphere of influence, and thus warp anything within that sphere into subspace."

"Sounds good. So instead of pulling the middle out of a star we'll just rotate the middle into subspace. Well we have our work cut out for us," smiled Hendricks. "I'll get a corps of techs on subspace, and a gang working on the space two. We'll run up a couple of spaces, too, just in case. I'll have a crew go to work on the subspace matter, and we'll eventually have a crew working on admixtures of extra spatial matter with spatial matter. We have enough work for ten lifetimes. Y'know, Billy, I'm going to set a slew of brand-new college kids to tinkering with the subspace problem under the direction of a hand-picked crew of elders. They've got a field that isn't overcrowded, anyway."

Billy scratched his head. "Look, Jim, I have an idea. Superdrive is fine stuff for batting around the Solar Sector. A run of fifty light-years, though, is a reasonable jaunt, and Sscantoo is off about a hundred and fifty light-years. Now if this time-difference in subspace is workable, we might be able to get to Sscantoo in jig time."

"I suppose so. But remember that this jig time you speak of is real time to you. To someone in space, you'll make the hop in record time, but to someone on the ship with you, the same time of a spatial trip will ensue."

"It's no great advantage as goes time or power," agreed Billy, "but when you're fighting a time limit, as we are, time in this space is what counts and if we have to go into subspace and study until we are a hundred years old before we find the answer, to come back with only a year gone, that's it. So see what you can do about tacking a warper into a spaceship, will you? And take another swing at the core of VanMaanen's Star. As soon as you have something, drop everything and bring it to Terra. I've got to get back, but quick."

Hotang Lu's return to Tlembo was hailed with silence. It was the silence of defeat, the sympathetic attitude for one who has tried, succeeded in his attempt, and found that his attempt lacked a vital factor. Hotang Lu had done his part. It was Terra that failed. Tlembo had guessed wrong. Yet Tlembo must try again and again until they became successful. The Little People were tenacious. They wanted their liberty, not slavery to the Loard-vogh.

And they would fight to the last Tlemban for it.

Not for Hotang Lu were parades and hordes of people to cheer him on his march up the broad avenue of his home city. He was whisked to the temple of government almost invisibly, yet the mental rapport of all Tlembans told them that Hotang Lu had returned—unsuccessfully.

Indan Ko, their ruler, gave Hotang Lu immediate audience.

"I've mentioned none of our

plans," said the ruler, "because I fear interception."

"Plans?" asked Hotang Lu bitterly. "With success in our grasp, they throw it away. What more can we ask?"

"Your tone is that of defeat. We must not admit it, even to ourselves."

"Self-delusion," spat Hotang Lu.

"Not at all. We know a setback when we see one. But we must not dwell upon it, lest we become single-minded and believe that our cause is doomed."

"Is there a better bet in the Galaxy than Terra?"

"There must be. Terra seemed a best bet. Yet perhaps their survival factor was so great that they prefer slavery to extermination. Is that rational?"

Hotang Lu nodded dumbly.

"We have Sscantoo."

"But they are almost at the pinnacle of their culture," objected the emissary. "We cannot energize their minds."

"Agreed. But they are an ungregarious race. They cling together only because civilization demands tribe-protection. They are fierce fighters. They hate every alien being. They dislike even contact between themselves, yet prefer that to traffic with an alien culture. Go to Sscantoo, Hotang Lu, and convince Linzete that his race is in danger of slavery at the hands of the Loard-vogh. Tell him, if he does not know already, that the Loard-vogh have conquered Terra. Perhaps Linzete knows what

Terra's secret weapon is. Was it ever disclosed?"

"The end came too soon. It was never used. Nor—and I cannot understand—did I see anything of its manufacture."

"Linzete has most of Terra's secrets by mutual agreement. Perhaps he has also that secret."

"Again I fight time," growled Hotang Lu. "Time—and I feel, the inevitable."

"I'd suggest a consultation with Norvan Ge, the psychiatrist. He will enable you to conquer that defeatist attitude of yours."

"I shall see him," said Hotang Lu. "I admit that the shock of being plunged all the way from almost-certain victory to utter defeat in a few short minutes has shaken my faith in even myself. I shall see him. Then I shall go to Sscantoo."

"Tell me," said Indan Ko, "what was the Terran attitude?"

"They accepted defeat as the inevitable. Their statement was that they fought to gain the respect of the Loard-vogh only; they did not hope to win. This I cannot understand. If you know that you cannot win, why fight?"

Indan Ko shook his head.

"It is my belief that they are rationalizing. No one accepts defeat. They have forced themselves into the belief that since victory is impossible for them, they must bow to the Loard-vogh or die."

"They may have some deep-seated purpose."

"Name it."

"Visit your psychiatrist," smiled Indan Ko. "Then consider. You were once their mental superior. It is hard to admit inferiority to one that was one time inferior to you. Accept their mental superiority and consider that they may have some plan."

"Plan?" asked Hotang Lu bitterly. "How can they plan? How can they execute any plan? Planning and building is for a free race, without the shackles of an overseer on their people or the restrictions placed upon a servile race. Could they build a modine without the Loard-vogh knowing? Could they hope to instigate an ten thousand year plan of expansion to eventually crowd the Loard-vogh out of the Galaxy?"

"I admit your point. I was hoping against hope. Clutching at straws. Perhaps we should both go to Norvan Ge. Tlembo will stop counting on Terra and fix our hopes on Sscantoo."

"I will be in Sscantoo within seven months. It will take that long in constant flight—and with your permission I shall take Norvan Ge with me. In seven months, the psychiatrist can aid me, and give me the self-confidence necessary to convince Linzete of his danger."

"Seven months," muttered Indan Ko. "And I will wager that Vorgan has his fleet poised for a blow at Sscantoo right now."

"So long as any Tlemban lives," said Hotang Lu, with a momentary return of his determination, "we will never stop hoping and fighting to preserve ourselves and all the

Galaxy from the conquering hordes of the Loard-vogh. I curse them, their name, and what they represent."

"I'll join you in that curse."

They lifted the slender tubes, inhaled deeply, and sipped the fluid. Indan Ko waved Hotang Lu farewell. "Go in haste and good fortune," said the ruler of Tlembo—the fourteenth Tlembo since the start of the Loard-vogh conquest.

XXI.

Vorgan scowled at Lindoo. "Dead, you say?"

"Starvation."

"Come now," said Vorgan derisively. "Sezare would hardly die of starvation. Assassination, yes. Overindulgence, without a doubt. Even sheer boredom I will admit. But starvation? Never."

"Deny your own medical corps, then."

"I admit it," snapped Vorgan. "But I am perplexed."

"There were no drugs."

"That I know. But look, Lindoo, Sezare was a fool, a stinking voluptuary if ever a Loard-vogh was. As sector overseer his palace rivaled mine. He carried on with a high hand. I recall my last visit. Frankly, I was slightly abashed. If Sezare had not been profitable, I'd have dropped him. He produced, therefore the lush palace and life he led were none of my business. I am not chicken-hearted, Lindoo, but to select the favorites of the home race as personal servitors to his own idea of sensuality seemed too self-indulgent. Select his choice, certainly. I can understand that." Vorgan's hard eyes softened at the memory. "But the concept that any that served him were then exalted, and must not be touched by a member of the slave race again—that was feudal."

"How did he enforce that?"

"There was seldom a need. Sezare was a voluptuary, almost a sadist. No servitor he ever had lived in health after the year he demanded. Broken in mind and in spirit and in body, they were disposed of as merciful terminations. His final act of vanity was to peacefully end the victim's life, giving the first rest in a year. Starvation, you say?"

"Yes."

"Sezare's palace ran red with wine, and the pillars groaned with the richest food that the sector bore. Overindulgence I will understand. Gout, autointoxication, acute alcoholism, drugs, or anything that comes of living in the lush manner. But starvation—how?"

"He was in complete starvation. He had dropped from three hundred and seven pounds to a scant sixty-three. He had locked himself in his suite and was constantly under the influence of a machine devised by . . . by—"

"Oho!" exploded Vorgan. "A machine! Devised by—?"

"A Terran."

"A Terran! Is he here?"

"Yes—he and his machine. Partially destroyed."

"Why?"

"Terror."

"Bring in the Terran. I'll see

him. And if he cannot explain to perfection, I'll see him burn!"

The prisoner entered. No glass separated them, for the Terran was sterile. He was forced to his knees, but if terror wracked the man, it was not evident.

"Your name?" thundered Vorgan.

"Edward Lincoln."

"Your trade?"

"Technician. Research co-ordinator for His Exalted Highness, Sezare."

"Sezare died of starvation."

"I know—it was deplorable. I fear that I was his unwitting murderer."

"You admit it?"

"I must. It is true. Had I but known—"

"Explain. Your life depends upon it."

"Sezare the Exalted directed me to devise for him a means of gaining greater sensual stimuli. Apparently the law of diminishing returns—you permit my personal opinions and observations?"

"Proceed. As you will."

Lindoo nodded and whispered: "His observations are a measure of his attitude. It is his attitude that will save or kill him, not his words."

The technician continued. "Sezare had indulged himself in every sensual manner. He was constantly on the search for something new, something more searing, something more thrilling. He directed me to devise some means of satisfying his demand for greater pleasure. That was most difficult, Lord of All, for Sezare had the entire resources of a galactic sector to provide his voluptuous demands.

"I succeeded in devising a machine that would give him dreams as he slept. Then, you see, when asleep he could indulge in his sensuous pleasures. That removed the necessity of stopping his round of pleasure to gain needed sleep; his round of lush living could go on continuously. I requisitioned the finest of artists, writers, and weavers of song to record the pleasures of life from the most fertile imaginations of the sector. Sezare, Lord of All, was imaginative, but not originally so. Soft living had made him lazy in thought, as well, and he preferred that any pleasurable thoughts be provided for him. So in having the most imaginative writers weave his dreams for him, I gave him a sensual pleasure far greater than the flesh was capable of enjoying. The power of the mind is greater than the flesh, Lord of All, and in my ambition to please Sezare, I overdid it."

"Overdid it? How?"

"I overlooked the fact that Sezare might find more pleasure in sleeping and dreaming than he would in waking and doing. He closeted himself with the machine. I . . . was nearly destroyed because I breached his chamber and tried to turn the machine off."

"True?" asked Vorgan.

"True," nodded Lindoo.

"He spent all of his time under the influence of the dream machine," said Lincoln plaintively. "He scorned the best efforts of his cook-

ing staff, and he scourged the collectors of his—women. None of them could provide for his pleasure like the machine. He retired to it, and in his strange acceptance of its pleasures, came to feel that sleep, under the machine, was real, whereas life, with its disappointments, must be sleep with bad dreams. Since the dream machine could provide only dream food, Sezare starved—his body starved, but his mind was content."

"Continue."

"Continue? There is no more. I had been trying to turn off the machine for weeks. I was denied, even threatened. Finally imprisoned so that I could not appeal for help. Sezare died, and I was sent here. In terror that some other of the Loard-vogh might fall victim, I have ruined the machine, and I shall die before I rebuild it. It . . . is worse . . . than the most entangling of drugs."

"Dismissed," said Vorgan dryly. The technician was led away, not guilty.

"Lindoo, what of Sezare's sector?"

"In charge of Sezare's underling, Narolla. Narolla has full control and he is competent. Narolla is not a voluptuary; he has seen too much of the dissolution of Sezare. And, Vorgan, it may be interesting to note that Narolla's productive output has increased."

"Already?"

"Sezare has been on the trail of starvation for weeks. Narolla took charge as of Sezare's withdrawal into dream-seclusion. Regardless of the Terran's act, or motive, the Loard-vogh benefits by the change."

"I agree. That is why I freed him."

"I am beginning to feel that Terrans can be trusted," said Lindoo.

"It all depends. It will not do to trust them too far in spite of their apparent willingness to help. Until we can be sure, we must be wary. Thompson's success in selling an antisocial culture on the proposition of complete co-operation will go a long way—if he succeeds."

"We could, perhaps, harden his job," observed Lindoo. "Suppose we let Sscantoo know that the integrity of Terra depends upon Sscantoo's acceptance of defeat without resistance?"

Vorgan laughed cheerfully. "Terra would not be liked in Sscantoo. No man can do anything but hate another man who is willing to sacrifice a former ally for his own skin. Under the face of that, if Terra can sell her bill of goods, she would certainly be working for her integrity."

"Well?"

"Relax," laughed Vorgan. "I happen to have one tiny bit of information that you have not. Hotang Lu went to Sscantoo as a last resort. He hopes to stir up trouble for us."

"I think you should erect that statue to the dishonor of Mangare. He should have destroyed Tlembo."

"He should have—and I shall have to. It seems to me that the proper plan of action is to find the

present Tlembo and get the little men in line before we take on anything else."

Indan Ko, the ruler of the fourteenth Tlembo since the Loard-vogh conquest blinked in amazement as the aide announced the formal visitor. "Thompson, the Terran?" he asked in surprise. "He who spat upon our future? What can he want with me?"

Billy Thompson entered the reception room uncomfortably. Indan Ko's presidential residence was built on a slightly more heroic mold than the normal housing plan of Tlembo, but still it left much to be desired. Tlembans stood an average of thirty-four inches high, and their lives and edifices were built upon that proportion. A Tlemban ceiling proportional to a comfortable ten-foot six Terran ceiling gave five feet three inches of clearance. That missed Billy Thompson's altitude by exactly ten inches. The formal residence of the ruler of Tlembo was of palatial build, with full seven-foot ceilings. It cleared the top of Billy's head by eleven inches.

An excellent building in which to contract claustrophobia.

And so Billy waited in the reception room uncomfortably. A large room to Tlemban thinking, its dimensions were proportionally small, and the thirty by forty feet —Tlemban—shrunk to fifteen by twenty, Terran.

The formal "court" was of more ample proportions. The proscenium arched forty feet high and the entire room was a full hundred feet in diameter. A vast room to Tlemban standards, but not much larger than a very tiny theater to the hulking Terran that had tripped over a table in one of the minute corridors.

Billy had been equally hard on the ceiling fixtures, and the doors had been somewhat of a pinch, too. But he was now in where he could take a full breath without fracturing the plaster on both sides of the room, and he took one, in relief. He felt very much like making a few pleasantries about his difficulties, but he realized that the little man on the dais before him would not appreciate any inference to size.

So Billy merely saluted formally and waited for the tiny monarch to speak first.

"You are Billy Thompson of Terra."

"I am."

"You are the man who directed the Battle for Sol?"

"I am."

"And the man responsible for the destruction of all hope for civilization."

"That I deny."

"You refused to use your secret weapon."

"It is that factor that I am here about," said Billy. "But first I wish to reach an agreement with you."

"An agreement? What agreement can we possibly reach? Tlembo has devoted her life to the job of stopping the Loard-vogh. Terra, when she had victory within her power, threw it away."

"I have come to tell you that Tlembo has failed in her mission in life. That Tlembo will always fail. That Tlembo will be better off if she recognizes that fact and accepts the inevitable.".

"Get out!" snapped Indan Ko. "You dare to force yourself into my presence and insult me!"

"Before you make any rash motions," said Billy calmly, "such as having me shot on sight—yes, I perceive the modine-ports in the walls— I wish to warn you and all of Tlembo that primates are gregarious and resent the destruction of one of their band. Kill me and Terra will descend in all of her power. We, who you claim could have been victorious over the Loard-vogh will find little difficulty in wiping Tlembo right out of the universe itself!"

"Providing that you have the support of your fellows—those whom your defeatist practice must have betrayed. Will those you failed now come to your rescue?"

"Hotang Lu is quite familiar with the Terran action," said Billy. "Did he report one single cry—from any Terran—for me to order retaliation?"

"You claim that the entire Solar Sector was in agreement with your surrender-policy?"

"I do."

"Then I understand our defeat. Terra has not the honor nor the willingness to fight for the freedom that is her right."

"Terra retains her integrity."

"At the will of a conquering race."

"We are leaving the subject," said Billy. "I made a statement to the fact that Tlembo has failed and will never be able to do otherwise. You are the one that can not face facts, Indan Ko."

"We shall fight to the last."

"To the last gullible alien," snapped Thompson. "Indan Ko, how can you possibly delude yourself into the belief that you will some day be victorious?"

"Because it is our belief that slavery and conquest are evil. And I define 'evil' as any factor working against the advance of civilization."

"Can you view both sides of a personal question dispassionately?"

"I have that belief."

"Then view the Loard-vogh dispassionately. Civilization throughout the Galaxy will be nothing unless the worlds are united. Stellar empires, discreet and belligerent, will result in chaos. Sectors such as Terra controlled would be embattled against sectors such as Sscantoo controls, and there would be a never-ending flurry of pacts and agreements and aggressions between one sector and others, against still others. That is chaos, Indan Ko."

"Perhaps you are right. But is the right to rule because of might a proper answer?"

"No. It is not. But I want you to understand that the Loard-vogh mental strategy is entirely selfish. The only thing that kept the Loard-vogh from sweeping through the Galaxy five thousand years ago, or next year, is the fact that they

cannot conquer and hold any system until there are enough of them to control it. They expand through the Galaxy in direct proportion to their birth rate. Since they enslave those systems conquered, and become high lords of creation in their conquered territory, there is nothing for them to do except procreate. The factors that inhibit racial expansion on any democratic world are numerous, but most of them stem from financial insecurity. Since the Loard-vogh have no financial insecurity, and a family with a horde of children are as well educated, well fed, and well clothed as a family with none, why not? Especially when there are slaves to tend and care, feed and provide. The system has its advantages, Indan Ko, which I am pointing out to you. Its disadvantages are also there, too. Those we know. They include lack of personal responsibility and a complete and utter disregard of the rights of another race to live as it wishes to live."

"Granted. But where is this leading us?"

"Merely to the acceptance of the statement that the Galaxy must be united. The Loard-vogh are uniting the Galaxy, and as such are doing the right thing. They are going about it in a rough-shod manner, but it is far swifter than the treaty - join - and - wrangle method. The Galaxy must be united!"

"Go on. I accept that but reject the Loard-vogh as racial saviors."

"My visit with you, Indan Ko, is to impress upon your mind that you are doing harm to the Galaxy."

"A matter of opinion," snapped the little man.

"Perhaps. You've heard my statements to Hotang Lu. Were it not for Tlembo, we would have lived in cheerful ignorance for another three thousand years. Now, because of you, we are awakened, with terrific responsibility, and must forever work like slaves to maintain that which we did not need before. You will continue, you swear. That means that Tlembo will go back and forth through the Galaxy, always hiding, always keeping ahead of the Loard-vogh conquested areas, and always seeking a race of ability, power, and freedom. Again and again you will find them. And again and again you will set them to fighting the Loard-vogh. And yet, to the Loard-vogh, you are nothing more than a gnat, whipping madly about the ears of a mastodon. Annoying but far from dangerous. How do you hope to win with such a plan?"

"We will find a race with sufficient power—"

"And when that race has the sufficient intelligence, that same race will understand the true worth of conquest. Terra was no real menace."

"The Loard-vogh thought so."

"The Loard-vogh were ignorant of our intellect. And," smiled the Terran cheerfully, "they were forced to collect us. Terra, in a long-time fight, could have beaten them."

XXII.

Indan Ko scowled and thought for a moment. This huge Terran that crowded his palace like a giant in a doll's house was not making sense.

"I do not understand."

"Terra is known as the Planet of Terror," said Billy, "because of the evolutionary system caused by the hard radiation in that district. You have seen the viciousness of our fungus, our micro-organisms, of our life itself. Could the Loard-vogh stand up against a bombardment, planet by planet, of fungus spores so tenacious that they grow on synthetic resins? Stellor Downing held a Sscantovian guinea pig in one hand for a moment and it died a most horrible death within minutes because of fungi that were innocuous to him. In my ship there is a slab of rare cheese. Delicious stuff, and what Terrans call 'quite high' because it is growing a full beard of mold. Could you—or the Loard-vogh—spread it on a slice of bread and eat it with impunity?"

"Definitely not."

"Seventeen million of the Loard-vogh died in the Battle of Sol, and more than half of them perished because Terran spores crept into chinks in their space armor. Chinks so small that they do not permit loss of air in space.

"You see, Indan Ko, the fear of Terra that drove the Loard-vogh frantic was because they thought that Terra would send out myriad after myriad of tiny spacecraft, loaded to the bomb bay doors with minute spore bombs. That we could have done. But we did not."

"That was your secret weapon?"

Billy shook his head. "Terra's secret weapon is her ability to grasp opportunity. Which brings me to the point of this interview. The Loard-vogh have a twenty-thousand year plan of conquest. No race can hope to stop them alone. No race in the course of a year, a hundred years, or even a thousand years could hope to defeat them alone."

"Terra could."

"That is not defeat. That is extermination."

"The Loard-vogh should be exterminated!" Thundered Indan Ko. The little man's thunder was slightly high-pitched to the Terran and not at all awe-inspiring. Billy merely smiled.

"It is not for any race to render sterile of life one quarter of the Galaxy. Extermination is not victory. War by proper definition is a measure used to impose your will upon a noncooperative government. Even the Loard-vogh understand that a dead slave is no good. Extermination may be *your* will, Tlemban, but you will fail in your conquest. Therefore I ask that you use intelligence. Stop lashing out like a hurt child. Stop shooting at the cliffs of living rock. The way to win is to husband your strength. Roll with the punches. Take them easy. Wait until you are set, and see the proper opening, and then drive forward. Collect allies in your stride, and play the double-game. Use your diplomatic ability."

"You plan a long-time retaliation?"

"Our plans are nebulous at present. Terra fought for one thing alone, and that was to gain the respect of a race that has only contempt for those that bow their heads willingly. Had we invited them in instead of fighting, they would have suspected foul play. We fought hard enough to convince them that we meant business. After all, our planetary heritage is such that we would be out of character if we gave in without a fight. Ergo we fought.

"Tlembo," went on Billy quietly, "has been frantic so long that she has lost perspective. That I claim, and it is deplorable, but not so damaging as to lose hope of repairing. Tlembo has been nicked again and again in her effort to find a savior. Her continued defeats have made her bitter, and ever more determined to win via the crushing defeat route. Consider this, Indan Ko, and then tell me if you think you are right in continuing to bring minor factors to bear against the Loard-vogh."

"And what would you suggest that we do?"

"Go to Vorgan. Ask immunity and audience. Vorgan is not without honor. He will respect your request for immunity. Then tell Vorgan that you fear the strength of his fighting forces, and that you will cease your constant effort to undermine the Loard-vogh. Tell him that Tlembo has certain factors that will enhance the Loard-vogh culture—you and he know what they are, as I do—and offer him those factors in exchange for Tlemban integrity."

"I dislike it."

"Naturally. But look, Indan Ko. You will be taxed terribly. You will be forced into handing over a certain percentage of your wealth. You will work for them, and for little remuneration. Yet your hardships will actually be less than the cost of fighting them. Now you must maintain a fleet, arm your cities against invasion, and always prepare for war. If you submit to the Loard-vogh banner you will be protected by the Loard-vogh, and may Heaven help any race that attacks Tlembo? The income you spend in being a nominal slave will be less than the amount spent in being an armed free-world."

"And eventual conquest?"

"Console yourselves with the certain knowledge that your hardships will all be avenged sometime. Not in your life, perhaps, but in the time of your descendants. Submit to their hard, exacting rules in outward abjection, but keep your mind forever on the future, when it will no longer prevail. And as you go, and as you find other races that are suitable, send their representatives to Terra. Terra will be the master-control of the anti-Loard-vogh combine."

"I shall think it over and discuss it with the Tlemban council. But what of Sscantoo?"

"Linzete must understand, also."

"But Hotang Lu is there now."

"What! Filling Linzete full of

the theory of bombing the Loard-vogh with Solar spores?"

Indan Ko nodded.

"Then I must go—and quickly!"

"Your trip will take months," objected Indan Ko. "Meanwhile, Linzete may set his machinery in operation."

"Contact him," said Billy. "And have him smooth it down a bit. My trip will not take months. I'll be there in days."

"Days!"

"Yes. We have a new mode of space travel. It will be yours as soon as you decide to join the Loard-vogh—"

"Terran, it sounds as though you were helping them."

"Naturally it does. Until we are ready to strike, we must aid them completely—and always remember that what we find and give them we will have ourselves. No single weapon won a war, Indan Ko. But if we can match them man for man, we will win because our wits are sharper. Now I must waste no time in getting to Sscantoo."

Billy's exodus from the Tlemban capitol building was more arduous than his entry. This time he was in a hurry, and moving swiftly through corridors too small for him, brushing doll-sized furniture with his mass, and crushing not a few of the smaller and more fragile pieces in his haste—to say nothing of squeezing two doors from their hinges in his passage—they all hampered him. Tlembo was going to pay well for this visit.

Outside, Billy towered above the Tlembans as he strode up the middle of the street, his head not more than a few inches below the trolley wire that fed the street car system. Traffic policemen gave him passage, for he could be seen for blocks. He turned into the spaceport and entered his ship.

He was met by Cliff Lane.

"How'd it go?"

"I think we got him. There'll be no more trouble from that sector."

"Good. Now what?"

"We whip this horse into action and head for Sscantoo. On the triple. Hotang Lu is there, telling Linzete of his danger and urging him to get set for conquest."

"Linzete is going to be a tougher nut to crack," observed Lane. "Well, let's get going. I've a few items to tell about Hendrick's researches in subspace matter."

Thompson's ship rose sharply, plunged into space, and then the distorting beam in the control room started to function.

"Think you can hit Sscantoo?" asked Billy.

"Breeze," smiled the pilot.

"But look, Tony, that's a long way off."

"So's Terra," answered Tony laconically. "We hit Tlembo all right, didn't we?"

"O.K., you're the pilot. Drop me on Sscantoo, and I'll invite you to a drink."

"A deal," grinned Tony. A moment later the pressure was built up, and the ship was wrenched into subspace. Then began the long, long journey to Sscantoo which would take less than a few days in

the universe from which they came.

"Now," said Thompson to Lane. "what's with Hendricks and his researches?"

"So far, subspace matter is enigmatic. It does not combine atomically or chemically with normal matter. It shows other physical properties, however. They separated the sample by the ancient method of using the various melting points and specific masses. The stuff has no gravitic attraction, but it has mass, you know, and they used a centrifuge on it. They got two kinds of matter. One we'll call metal for the simple reason that it conducts electricity. The others are nonmetals because they do not conduct electricity. There was a small quantity of a light blue gas that was occluded in the dirt, it boiled off early and they caught it. Well, if nothing else, it will come in handy for surgeon's tools, chemical hardware, and the like, since you can put anything into it and it will not dissolve or go into chemical combinations. I betcha we got something to hold the Universal Solvent."

"Yeah," grinned Billy. "Takes something strictly out of this world to do it, though."

"Since there's no weight to it, the stuff still heads for the roof. The gas, they say, boiled off down, since the vapor pressure and atmospheric brownian movement drove it that way. Good stuff for antibends atmospheres, I'd say. Mix it with twenty percent oxygen and breathe it. It will not dissolve, at least no detectable loss is noticed with the instruments that Hendricks has."

"There's a brand new system of chemistry, nuclear physics, and garden-variety physics out there," said Billy. "We've opened up a new field, or maybe two. Well. we've got several months here. Let's get to work.

Vorgan, Lord of All, smiled in a puzzled manner. "You have my word," he said. "Your immunity is granted. Complete and absolute immunity, with the right to speak as you wish without fear of reprisals. What is the nature of this visit?"

Indan Ko shifted nervously. He felt a great uncomfortable fear of this vast room, that seemed to stretch endlessly. The dais upon which Vorgan sat was like a mountain to the little man, and each step was knee-high to Indan Ko.

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"Tlembo is weary," said Indan Ko. "Yet we are bitterly afraid."

"Of what?"

"Slavery."

Vorgan shrugged. "It will come sooner or later."

"Lord of All, may I offer you a bargain?"

"Bargain?" grunted Vorgan.

"Tlembo has been a source of discomfort to you. We have forced you off-balance several times, have caused you to go forth and fight in sectors where you were not ready to enter. We have been instrumental in causing you to change your master plan."

"Right."

"We have never been a real menace to you," went on the little man, "but we have been annoying. Now if I offer you our promise not to stir up any more trouble, will you offer us less than utter and abject slavery?"

Vorgan blinked. The bluntness of the offer was startling to him, and the offer itself was a new facet to the Loard-vogh conquest. He snarled inwardly at Mangare again, cursing the long-dead Lord of All that had permitted the initial escape of the Tlembans. But snarling at a dead man's mistake was not solving this problem, and Vorgan dropped it to consider Indan Ko's startling offer.

Until recently, nothing like this could have come up. Save for three or four times in the past—before Vorgan's time—when Tlembo had created minor riots, the Loard-vogh conquest had been lightning fast and completely unheralded. A sector would be overrun, a star cluster at a time, and no word would go out ahead of their plans. Races fell before their might, and then lived in slavery. A slave has no position, and no right nor ability to offer terms. Therefore terms were a consideration never before handled.

Terms, by themselves, offered a conflict in Vorgan's mind. Bartering and buying among the Loard-vogh was normal, of course, but the concept of terms from an alien race struck a snag, somehow.

Yet Vorgan could see the point. A chance for the Loard-vogh to complete their master plan without the interference of this race of trouble-makers. True, the Loard-vogh must relinquish the right to hold them as absolute slaves. Perhaps a single representative in the Lower Council would suffice. At any rate, giving a little right now might mean less loss for the future. Vorgan groaned at the thought of all the races of the Galaxy asking terms, and getting certain conditions of servitude. Better to give a little to this one race than to go on trying to keep a galaxy full of races satisfied.

No, he thought, not one race. That makes two! Terra had certain advantages asked and offered. But Terra had been defeated, and only her very brilliant ability had won her the right to a certain freedom. And, of course, Terrans were helping the Loard-vogh on a myriad of planets, doing things that the Loard-vogh found difficult, mentally.

But to keep Tlembo from stirring up trouble might well be worth the effort. Tlembans were not the intelligent race that the Terrans were, but—

Vorgan laughed. Let the Terrans have another job. They could possibly use the Tlembans in some way. Let Terra keep Tlembo satisfied and quiet and useful! Terrans were of exceedingly high intelligence, and the results of their researches often required either that the Terrans follow it, or that the Terrans direct a number of Loard-vogh. The latter was not right, politically, and it had been a bother to them all.

To have a large group of Terrans all running down important details seemed better, though Vorgan admitted that it was a waste of good brainpower to have highly trained technicians performing routine research. Tlembans were of a high order of intelligence, though not as high as the Loard-vogh. They might be able to handle the routine experiments and act in tertiary capacities under Terran direction.

An excellent idea.

"Indan Ko, I offer you a brief period of armistice. Permit me to consult the Grand Council. I—"

Lindoo entered, hurriedly. "Lord of All, Borgara's machine is here!"

"Indan Ko, I must see this immediately. Consider the armistice while I am gone, and rest assured that I am about convinced that we can come to terms. I shall return directly."

Vorgan followed Lindoo into the large anteroom that opened on the nave of the reception room. There were six of the Loard-vogh Grand Council there, grouped around a machine of amazing complexity. It was more amazing because it did not appear to make good sense. Vorgan thought that perhaps it would make sense after it started to run.

And the thing that made Vorgan catch his breath was the Terran sitting in the corner with folded arms.

"Well," said Vorgan shortly, "what does it do?"

Lindoo stepped forward and snapped the switch on the base. The Terran leaped to his feet and snapped it off.

"Don't!" he warned.

"That was a rash thing to do," snapped Vorgan.

"I may be rash," admitted the Terran. "But lese majesty is permissible when a life is in danger."

"Lindoo, give me the details."

"Borgara went crazy."

"Crazy? How?"

"I don't know. But it was tied up in this machine, somehow."

Vorgan turned to the Terran. "Every time we have something out of line going on here, we find Terra mixed in it. What is your name, Terran?"

"Edward Atkins."

"Position, Atkins?"

"Technician."

"And what is this machine?"

"A device I made at Borgara's direction."

"Borgara went crazy. Why?"

"Because he used this machine. I insist that it remain dormant. Otherwise the rest of you will be caught in the same unfortunate trap

that befell Borgara the Powerful."

"No doubt deplorable," observed Vorgan dryly.

"Quite. I did his bidding, and he became enmeshed in it."

"I'm not too surprised," snapped Vorgan. "So give me your side of the details. About one more like this and I am going to wipe Terra out."

"Forgive me if I seem to slur a member of your race," said Atkins earnestly, "but Borgara was a bitter tyrant. He held his rule by sheer force and violence. He maintained his productive output by torture. He cared little for pleasure or ease, and he drove the people in his sector unmercifully. On one planet, Borgara set up a rule that any man who did not produce a given amount would find one member of his family entering the Grand Torture Chamber. Torture threats against a person are far less demanding than threats against a member of the immediate family. And, Lord of All, he set the minimum limit slightly above the average output, and kept it rising.

"Borgara found his pleasure in watching people in torture. The trouble was that the more satisfying kind of torture didn't leave a victim alive too long. So Borgara directed me to devise a means of torture that would be most terrible and yet would not kill too soon. I did—and it is this machine."

"Yet it drove Borgara insane."

"Correct. Permit me to remove a few important parts?"

"To demonstrate without danger?"

"Yes."

Atkins stepped forward and removed two tiny wheels and a glistening sphere. "Now start it," he said. "The danger is gone."

Lindoo snapped the switch again. The myriad of levers began to reciprocate. Tiny flashing wheels started to turn, and pencils of light flickered through the facets of the rotating spheres. It was a fascinating machine, utterly fascinating. It increased in speed, and the flickering, flashing, interwoven motion flowed with a noiseless violence. In and out, through and through in a mad pattern went the parts. And as they watched it, the machine lost its mechanical shape, apparently, and became an almost living thing that breathed and was—shapeless. The individual motions became one master writhing.

And the Loard-vogh stared at the machine with horror on their faces. There was sheer and utter horror there, but they could not move away, nor could they speak. They began to writhe a bit, as something in their mental attitude caused the onset of physical pain, and the writhing grew more violent.

Atkins stepped forward and turned the machine off.

Vorgan stormed.

"I thought there was no danger!" he shouted, rubbing a muscle that had cramped.

"No danger," said the Terran with a faint smile. "You see, when I removed these parts I protected myself so that I could turn the machine off before it became really

dangerous to you. I wanted you to see and feel for yourselves just what Borgara thought excellent."

"But we were going insane and were aware of it!"

"As a means of torture, can you think of any better?" asked Atkins. "To sit there, watching the machine, knowing that it is driving you insane, and that the machine is causing you physical pain, and that there is nothing that you can do about either—that, Lord of All, is the supreme torture."

"And Borgara got caught, is that it?"

"Unfortunately for Borgara, he used it once too often. He got tired of watching the victim, and watched the machine. Since he was alone in the torture chamber, it—got him. I beg of you, destroy it. I'd not care to be responsible for more trouble."

Lindoo opened a drawer in the chest, took out a high-power modine, and blasted the machine to ribbons. "Atkins, too?"

Vorgan shook his head. "He was only doing what he was told. Borgara's Sector is in good hands, they tell me, and the new overseer has released forty million fighting men that Borgara needed to control his sector. No, I think . . . dismissed, Atkins . . . that once again the Terrans have done us a favor."

Vorgan returned to Indan Ko. "Tlemban, tell me something. Was Terra behind your decision?"

"Yes," admitted Indan Ko. "Terra pointed out that the Galaxy must be united and that the Loardvogh were doing just that. Terra does not grant that the means you are using are correct to their ideals, but they admit that you are doing it quickly and efficiently. And they point out that we can never hope to win, ergo we should make the best of defeat. So—"

Vorgan groaned. "Terra—what next?"

And then he straightened his face again, and said: "Your terms are granted. Your instructions are to report to Terra as assistant operators. Your immunity becomes eter-

nal, Indan Ko, and your integrity is maintained as well as it can be when you are taking orders from Terra. And," he smiled, "perhaps it will keep Terra out of my hair."

XXIII.

Billy Thompson faced the catman in spite of Linzete's hiss of disapproval.

"I know of our danger," snapped the ruler of Sscantoo. "Few know it better than I. I was on Terra just before trouble struck, and I know and appreciate the mass against me. And you tell me to submit willingly."

"Might as well," said Billy. "It's inevitable."

"Sscantoo has one chance," said Linzete. "And that is to use Terra's secret weapon."

"You haven't got it," said Billy flatly. "And if you mean spore-bombing, don't be an idiot."

"Idiot?" snarled Linzete. "Better an idiot than a turncoat that is now fighting his conquerors' battles for them. You commanded a certain amount of respect, Thompson. But that debt was canceled on the day that you started to curry favor. Go back and fawn upon the Loard-vogh; do you think that I don't know what's in your mind? You'll willingly sell Sscantoo into slavery in order to gain a little more voice in your plaintive wailing cry to Vorgan."

"I—"

"As you sold Tlembo to the Loard-vogh."

"I've sold no—"

"Where have you been?" snarled Linzete.

"Coming from Tlembo," admitted Billy with a laugh. "And there has been no communication because we have been traveling in subspace. It took us four days to cross space from Tlembo to here. We've been out of touch with the Universe for months, as far as we're concerned. Now if Tlembo is being sold, I don't know about it."

"Hotang Lu left three days ago because he was withdrawn. His statement was that Indan Ko was taking the trip to Vorgan's capitol in order to offer terms of surrender. Explain that!"

"Indan Ko was intelligent enough to understand the implications behind fighting. Look, Linzete, I sold Tlembo a theory of operations. You cannot hope to win alone."

"We can exterminate them."

"And in doing so, render unfit for life a quarter of the Galaxy? That I will not permit. And, Linzete, any extermination you perform will be strictly post-mortem. Granted that you have the ships and the men and the spores all grown or collected and packed into bombs. From a single bombing of a Loard-vogh planet to extermination of life on that planet will be a matter of six months to a year. Meanwhile, the Loard-vogh will have attacked and conquered you. Think Terra didn't think of it? We did and we considered it well. But Linzete, we like to remain alive. We destroyed seventeen million of the first-line fighting men. That was war, and the men were expend-

able. A nice nasty term. Terra lost seven thousand because Terra does not consider any man really expendable. The situation is about even. But consider their utter hatred and violence to find a single planet bombed into lifelessness ever afterwards by filling it with sheer death-rot."

"I see the point, but if we're to lose, let's lose honorably, die fighting, and take as many with us as we can."

"A poor attitude. You must fight to win and to live, Linzete. War is a means of forcing your will upon an enemy, Linzete. That means there are a number of different kinds of war. War per se is usually the last resort. There are social wars and economic wars, and people do not consider them too violent. But a shooting war gets everybody all worked up.

"There has been a lot of talk about Terra's secret weapon, Linzete. It has been explained again and again. Terra's secret weapon is the intelligencec to recognize fact, even though obscured. If you had your choice, Linzete, which would you rather be, the nominal ruler of a sector or the man whose advice is taken on every decision—who, in fact, tells the ruler what to do?"

"Lacking the right to be both acknowledged ruler and factual ruler, I— That is a problem that has never occurred to me."

Billy said, very patiently, "Terra knows. Terra will win this war. Our will—to be imposed upon the Loard-vogh—is that they take their decisions from our advice. As such, we have the rule of the Galaxy. I tell you this because Sscantoo has too much to gain by absolute co-operation with Terra. Eventually the Loard-vogh will be seeking our advice. I have sent them Indan Ko, the ruler of a race that has caused them no end of trouble. Indan Ko will not arrive there for months, yet I can predict that Vorgan and Lindoo will place the Tlembans directly under Terran supervision for divers reasons, not the least of which is the fact that Vorgan will prefer to place under Terra any intelligent race who are more than conquered slaves. Allies, in a sense. That's because the Loard-vogh have never yet experienced any allying. Their past is devoid of practice. So it will be with Sscantoo. You will come under our jurisdiction."

Linzete shrugged. "Win, lose, or draw, Sscantoo seems doomed."

"Nonsense! Sscantoo will reap the benefits of a Galaxy-wide culture. Sscantoo will reap the benefits created by Terra, and without the battle scars that Terra will bear forever. Fight them, and you will die. There is little sense in being dead, Linzete. Never again will the Loard-vogh conquer and enslave. From now on in, they will find their selected victims prepared and allying with them, offering them facts and facets of culture, and sponsored by Terra. Terrans are already high in the councils of the Loard-vogh as technical advisors. They calculate and they advise, and they will advise terms for this sys-

tem and for that system, and the end-product will be to weld the entire Galaxy into one solid culture.

"Fight them?" laughed Billy. "Why fight them when we can outmaneuver them before the logisticians can cover their first page of trial equations."

"Trouble is," said Linzete, "that Sscantovians are a rather belligerent race, and entirely individualistic. And the Loard-vogh are extreme militarists."

"Sscantoo's job is clear. Sscantovians like isloation and lone-wolfing. That's why I am here pleading with you." Billy pointed out of the overhead dome into the bright sky. "Out there, somewhere, there must be another culture that really needs extermination. More than half of the Galaxy lies out there. Linzete, take your lifetime and your planet's resources and go out and find for me a whipping post to keep the Loard-vogh in fighting trim. It's precious little warfare they'll get at home from now on in."

Linzete purred. "You seem to have solved our problem and theirs all in one plan. Terran, it is a deal."

"Sscantoo will not be sorry," promised Billy.

Linzete nodded, and poured a drink from the carafe at his elbow. "To a united Galaxy," he said. They drank. "Tell me, Billy, what happens when you meet a race that will not listen to reason, having planetary defenses too powerful to attack?"

"We have a means of rotating a five thousand mile sphere of their sun's core into subspace. It makes a violent variable out of it, and forces the race to migrate within a year. During migration, of course, they are helpless and they can be handled with ease."

"Um," swallowed Linzete. "I see."

The color of his face showed that he did see.

Once more the months rolled past. The trip was made to Terra in subspace, to save time, but when Billy arrived, his greeting to Patricia Kennebec was hungry and demanding.

"You'd think it were months," she objected mildly.

"For me it has been," he confessed.

Another month rolled by, and it went with a peculiar time-sense, for it was both violently swift at times, and at other times it dragged like eternity. Both of them would have preferred a quick wedding, but position interfered with the process. But the month ended eventually, and after a solid round of formal affairs punctuated by less formal details, they got the right and the opportunity to take to their spaceship together.

And the four months that followed drove past as swiftly as the light-years logged up on the recorder. Theirs was an ambling passage through prime space; they stopped at four or five intervening systems on their way.

Their arrival at Vorgan's capitol followed the visits from Indan Ko and Linzete. Billy knew, and

smiled inwardly. He'd planned it that way.

"Stick around," he told her with a grin. "Females are strictly nom de something-or-other in there at present. I'll be out directly."

He entered and saluted Vorgan. Lindoo was less affable than the Lord of All, who smiled.

"A nice piece of work, Terran," said Vorgan.

"Thank you."

Vorgan turned to Lindoo. "You once told me that you would step down when your master at diplomacy came along," he twitted.

Billy smiled at Lindoo. "I gather that I executed your wishes to perfection," he said.

Lindoo blinked.

Vorgan turned back to the Terran. "His wishes?"

"Certainly. I admit that I took liberties with my orders, but I couldn't know whether settling the Sscantovian affair without losing a man included Tlembo as well, because by the time I took stock, they were allied, and we of Terra always consider that a confederate rates the same treatment as the prime contractor."

"But I do not understand. Did Vorgan issue any orders?"

"I am responsible to him. I am among his advisory staff. He selected me. It was his ability to select me that puts him in the position of ordering me."

"Proceed" said Vorgan.

"Lord of All, a responsible assistant certainly does not require a written order for every act. Not among Terrans, anyway. A good

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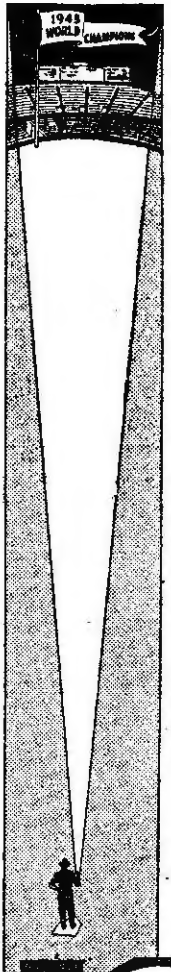

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supervisor selects assistants who can anticipate and act upon his wishes. A good assistant can act as his superior would act, and knows his superior's wishes. Therefore I was but anticipating Lindoo's plan, and acting in accordance with my knowledge of his desire."

Lindoo blinked, and the storm-cloud of his face cleared. Vorgan smiled slightly. "Keep him," he said. "He will do a lot for you."

Lindoo would require a bit more soothing, Billy knew, but that could come easily and soon enough.

He was dismissed and as he left, Billy smiled inwardly. Let them rule. He and his cohorts would rule the rulers. He had a fairly complete picture right now. They had rid themselves of Sezare the dissolute voluptuary, and Borgara, the tyrant, and there was a sector not too far away where one Terran had convinced the overseer that an experiment in offering the slaves better living quarters and a better future might pay off. It would, for the downtrodden sector against which the model project was stacked knew of the "race" in production and were taking it easy. The model project's output might even be double. And several sectors were combing close to locate intelligent assistants and specialists to aid the Terrans—the research sector. And Terrans in large groups were roaming the galactic front, using their ability to speak and communicate with any race. They could enter any system that used a reasonable facsimile of Terran air for an atmosphere, and disease and death did not touch them. Their arguments were brilliant, and they achieved without fighting that which the Loard-vogh could not do. If the Loard-vogh felt that things were moving too fast, they had but to inspect their birth records. With less fighting, there was less absence of the fighting men—

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Vorgan, Emporer of the Loard-vogh, Lord of All, and his race fought for the unity of the Galaxy. They still thought they ruled it as they would—

THE END.

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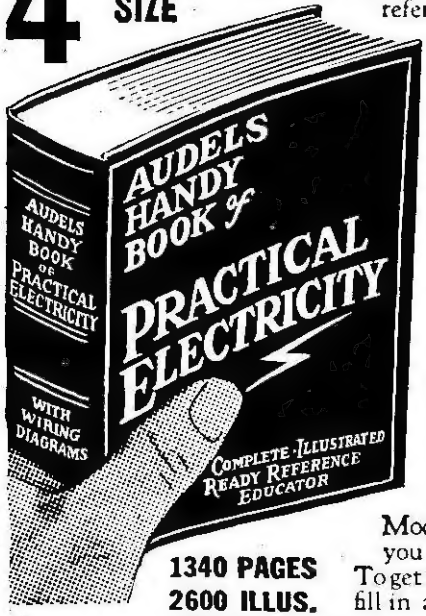
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